U.S. Commissioner
of PATENTS

Annual Report
for
1844

with List of
PATENTEES

197

1972

REPORT

OF

THE COMMISSIONER OF PATENTS,

SHOWING

The operations of the Patent Office during the year 1844.

JANUARY 29, 1845.

Read, and ordered that a motion that it be printed, and that 5,000 additional copies be furnished for the use of the Senate, be referred to the Committee on Printing.

JANUARY 30, 1845.

Ordered to be printed, and that 20,000 additional copies (omitting the lists of patents) be furnished; 19,500 of which for the use of the Senate, and 500 for the use of the Commissioner of Patents.

PATENT OFFICE, *January* 28, 1845.

The Commissioner of Patents has the honor to submit his annual report for the year ending with the close of 1844.

Five hundred and two patents have been issued during the year 1844, including seven reissues, twelve designs, and five additional improvements to former patents, of which classified and alphabetical lists are annexed, marked N and O.

During the same period, five hundred and thirty-nine patents have expired, as per list marked P.

The applications for patents during the year past amount to one thousand and forty-five, and the number of caveats filed was three hundred and eighty.

The receipts of the office for the year 1844 amount to forty-one thousand two hundred and twenty dollars and six cents, from which are to be deducted, repaid on applications withdrawn, as per statement marked A, ten thousand and forty dollars.

The ordinary expenses of the Patent Office for the past year have been twenty-four thousand two hundred and twenty-eight dollars and four cents; to which add, for library and agriculture, two thousand and seventy-six dollars and forty-nine cents, leaves a nett balance of six thousand one hundred and sixty-four dollars and seventy-three cents, to be credited to the patent fund, as per statement marked B.

For the restoration of models, records, and drawings, under the act of 3d March, 1837, the sum of two thousand eight hundred and twenty-two dollars and sixty-six cents, as per statement marked C.

The whole number of patents issued by the United States, up to January, 1845, is fourteen thousand and twenty-four. Although the number of patents granted the past year is not so great as that of the year previous, it will be seen that there is an excess of applications to the amount of two hundred and twenty six.

The increase of models renders daily the transaction of business more

difficult. The models of the patented inventions are crowded so much as to prevent classification; while models of rejected applications, equally important for exhibition, to enable supposed inventors to settle doubts as to originality, are not exhibited at all. It has been hoped that the large upper hall, designed originally for models, would not be diverted to other objects without some substitute being furnished. The beautiful collection of curiosities, however, from various parts of the world, forming the *National Gallery*, are too important and interesting to be crowded out. There seems to be no alternative but to extend the building. This can be done at a moderate expense, if the work is performed by contract, under careful supervision. No new plan need now be presented. The original design contemplated two additional wings, one of which, added on the west side, would give sufficient accommodation by furnishing continuous rooms for models and the gallery. The number of applications for the extension of patents during 1844 was twelve. Two were granted, and ten rejected.

The board of commissioners have extended seven patents since the act of Congress approved 4th July, 1836.

Patentees seem to think, that if they pay the fee required, and show that they have not made the patent profitable, (and especially if no objection is urged by the public against the extension,) that the extension will be allowed as a matter of course—forgetting that all patents granted prior to the reorganization of the Patent Office in 1836 were not subject to examination as to novelty; in other words, any applicant prior to that time, who was willing to swear that he was the first and original inventor, could demand a patent, leaving the courts to settle questions of utility and originality. Many patents granted prior to 1836 do not, therefore, contain any merit, and an extension of the same would only end in disappointment, if the originality were tested.

By reference to the decisions of the board of commissioners, composed of "the Secretary of State, the Commissioner of Patents, and the Solicitor of the Treasury," it appears that extension of patents cannot be expected when the invention is trivial, and where the right to use and vend the same has been unmolested; or where the machine is not complicated, and little expenditure of time or money is necessary to introduce it—they believing, it is supposed, that it would be better thus to place before the patentee (who can deprive the public of the use of the invention) the strongest motives to bring the same into immediate use upon fair and equitable terms, rather than delay with indifference fourteen years, thinking that he can get an extension for seven years more. If patents were extended upon applications as a matter of course, it is evident most patentees would apply, and thus make the duration of all patents equivalent to twenty-one years—crowding too, upon the board of commissioners, an amount of extra labor which they could not possibly discharge.

It may here be remarked, that, however desirous Congress might have been to make the section of the patent law under which patents are extended clear and explicit, much litigation has arisen upon its construction; and I feel compelled to mention the contradictory decisions, that further legislation may be had, if deemed expedient.

The 18th section is in the following words:

"*And be it further enacted*, That whenever any patentee of an invention or discovery shall desire an extension of his patent beyond the term of its limitation, he may make application therefor, in writing, to the Com-

missioner of the Patent Office, setting forth the grounds thereof; and the Commissioner shall, on the applicant's paying the sum of forty dollars to the credit of the Treasury, as in the case of an original application for a patent, cause to be published in one or more of the principal newspapers in the city of Washington, and in such other paper or papers as he may deem proper, published in the section of country most interested adversely to the extension of the patent, a notice of such application, and of the time and place when and where the same will be considered, that any person may appear and show cause why the extension should not be granted; and the Secretary of State, the Commissioner of the Patent Office, and the Solicitor of the Treasury, shall constitute a board to hear and decide upon the evidence produced before them, both for and against the extension, and shall sit for that purpose at the time and place designated in the published notice thereof. The patentee shall furnish to said board a statement, in writing, under oath, of the ascertained value of the invention, and of his receipts and expenditures, sufficiently in detail to exhibit a true and faithful account of loss and profit in any manner accruing to him from and by reason of said invention. And if, upon a hearing of the matter, it shall appear, to the full and entire satisfaction of said board, having due regard to the public interest therein, that it is just and proper that the term of the patent should be extended, by reason of the patentee, without neglect or fault on his part, having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity, and expense, bestowed upon the same, and the introduction thereof into use, it shall be the duty of the Commissioner to renew and extend the patent, by making a certificate thereon of such extension, for the term of seven years from and after the expiration of the first term; which certificate, with a certificate of said board of their judgment and opinion as aforesaid, shall be entered on record in the Patent Office; *and thereupon the said patent shall have the same effect in law as though it had been originally granted for the term of twenty-one years; and the benefit of such renewal shall extend to assignees and grantees of the right to use the thing patented, to the extent of their respective interests therein: Provided, however,* That no extension of a patent shall be granted after the expiration of the term for which it was originally issued."

It may not be improper here to notice the construction of this section by the board of commissioners, whose duties are defined by it, viz: that the *benefit* of the extension inures to assignees according to their respective interest in the thing patented, be it more or less, whether it be a right to use the specific machine or article sold, or a right to make and sell in a town, county, or State.

Had the board doubted upon this point, I feel no hesitation in saying that they never would have consented, "having a due regard to the public interests," to the extension of several patents which have been extended.

If the benefit of extension were confined to the patentee alone, assignees, however late their purchase, and however much they might have expended in fixtures, might be at once enjoined even from using the very article purchased—a result certainly wholly unexpected to the assignee when he entered into covenant with the patentee.

In the district embracing New England, assignees have, by the circuit judge of that district, been enjoined fully, in numerous cases, and compelled to purchase even the right to use the invention after extension of the patent.

In the district of Maryland, however, before the Chief Justice of the United States, the same point has arisen, and, after full argument and mature consideration, been decided directly to the contrary, viz: that the extension of a patent does inure for the benefit of the assignee. Various decisions have been made in circuit courts, where the same was held by the district judge, differing from each other. It is highly important, therefore, that the question of benefit of the extension should be speedily settled by further legislation or by the Supreme Court.

The success which has attended the efforts of American inventors, by taking out patents in Europe, will induce many others to secure the same privileges. Hence the frequent inquiry at the Patent Office, how can patents be obtained abroad? Although willing to communicate all information on this subject that I possess, other duties do not permit me to reply to letters received containing such inquiries. To gratify inventors, I have annexed a brief synopsis (marked E) of the general regulation for taking out patents in foreign countries. With pleasure will it be noticed, that in no country are patents obtained so cheap, or with so little delay, as in the United States; and yet inventors here are proverbially impatient.

The increasing business of this office will soon demand additional force. In the mean time, I cannot omit to present to the consideration of Congress the claims of the scientific corps who conduct the business of the office to a more adequate compensation for their services. I do not allude to the salary of the Commissioner of Patents. Deep study and a knowledge of different languages, a minute acquaintance with the arts and sciences, and much experience, are all required, to fit an individual for the office of examiner; and yet his pay is only $1,500—less than is paid for clerical duties in many of the bureaus. The present compensation will be inadequate to induce those now in the office to remain, and much more to replace the assistance needed, if a vacancy occurs. One examiner has already tendered his resignation, and consented to remain, in the hope of further legislation. I beg to ask, if, while the income of the office is fully sufficient to meet all necessary expense, whether it would not be a matter of the deepest regret to part with experienced help, for new and untried hands. What blunders, what errors, what litigation, would ensue! The public, it is hoped, have some confidence in the office. If this confidence is lost, dissatisfaction would arise, and appeals take place. It is due to the corps in this office to say, that their pay is much less than is made to other officers in like capacities. The following sums are paid, viz:

To the chief of the coast survey	$6,000
To one assistant	3,500
To two assistants	3,500
To three assistants	3,500
To four assistants	2,000
To five assistants	2,000
To six assistants	2,000
On weights and measures	2,500
In the navy—	
Engineers for planning engines	3,000
Principal engineer for superintending and constructing steam engines	2,500
Chief naval constructor	3,000
Assistant	2,300

United States mint—

Director	$3,500
Coiner	2,000
Assayer	2,000
Melter	2,000
Engraver	2,000

Other instances might be cited.

It must be admitted, that the discharge of the duties of several of the above stations does not demand the talents or acquirements necessary for an examiner of patents, who must have a knowledge of the physical sciences, and understand their application to those branches of industry to which they are adapted; possessing, also, a knowledge of the patent law, the decisions of the courts, and at least an acquaintance with the French language.

A reference to the report of the examiner of patents, transmitted with this and my last report, will show their duties, and the abilities necessary to discharge them.

It is a happy circumstance, that few changes have taken place in the effective force of this office since my connexion with it. We have every year enjoyed the benefit of accumulated experience.

I have, however, to record with sorrow the sudden death of the late chief clerk, Mr. Hand, a few months since. His removal has been mourned by all his associates. He possessed pre-eminently qualifications needed at his desk; and has left an example worthy of imitation, adding another proof that a faithful discharge of public duties is not incompatible with the life of a devout Christian.

I have added to my report the claims allowed on patents granted, and again requested the report of the examiners on the progress of the arts during 1844, (see F and G,) believing the same will be read with interest, while they will remain on the archives of the office, to instruct those who survive in this department. It is a matter of proud congratulation, that we witness the rapid advancement of the arts and sciences on this side of the Atlantic, and to hear how frequently the skill and experience of our citizens are purchased by the wisest monarchs of Europe. The liberality with which our artisans are compensated abroad is the highest proof of their superiority. Our manufactures are extending throughout the world. The ocean and the land alike bear testimony to American ingenuity. Praise is but a tribute due to her Constitution and the laws, which extend equal rights and privileges to all.

Among the most brilliant discoveries of the age, the electro-magnetic telegraph deserves a conspicuous place. Destined as it is to change as well as hasten transmission of intelligence, and so essentially to affect the welfare of society, all that concerns its further developments will be hailed with joy.

Imagination can scarcely conceive what is now accomplished by the electric fluid, when confined and tamed, as it were, to the purposes of life. Distance is annihilated—thought has found a competitor. Nor is it less gratifying that this invention is American. To a native citizen belongs the merit of the discovery; and it is hoped that the country of his birth will reward him accordingly. The public, at first, could scarcely believe it possible that intelligence can be sent at the rate of 188,000 *miles in a second;* nor that the earth would suffice for half of the current of communication; nor that currents of electricity from opposite poles would traverse the

same wire at the same time, turning out as it were in passing each other. Such are proved to be facts. One discovery presses upon the heels of another. The desideratum of furnishing electricity by mechanical means is at length found. This discovery, the handmaid of the telegraph, belongs to another of the sons of New England. The practicability of this last invention has been fully tested for 40 miles, leaving no doubt that it will succeed wherever the battery would answer. A fuller description of this invention of Professor Page will be found in the paper subjoined, marked H.

Obstacles seem fast overcome. Rivers no longer remain obstructions; they are passed without any superstructure or any conductor through the water. How this is done, will be seen by adverting to the diagrams on the paper subjoined, marked I.

The numerous requests for information respecting the telegraph since my former report are my apology for inserting in this report some facts mentioned hitherto, since all that is given seems necessary to a full comprehension of this highly exciting subject. This report may go into new hands, who cannot readily refer to a former one, and who will be glad to find all condensed in the one now transmitted to Congress.

The annual agricultural statistics, comprising the tabular estimate of the crops the past year, with accompanying remarks and appendix, will be found subjoined, marked D. If the length of the document is objectionable, I will only say that I have deemed it more acceptable to the public to give the facts established, than deductions from them; more especially, as no conclusive opinion can be justly formed on contradictory statements respecting some important subjects.

The science of agriculture has now become a study, and much greater improvement may be expected. Worn-out lands, that have been, as it were, abandoned, are now being reclaimed, under scientific treatment. Guess work and hereditary notions are yielding to analysis and the application of chemical principles. The writings of learned agriculturists in Europe are translated into the English language—thus pouring a body of new light upon the path of the husbandman. Some extracts from the celebrated Von Thaer's Principles of Agriculture will be found in one of the appendixes to the agricultural report. They evince the deep research and patient investigation of that distinguished philanthropist. Little is accomplished in any science without perseverance. How many bright anticipations have been blasted by a single unpropitious experiment! Without making allowance for ordinary casualties or unforeseen occurrences, how many efforts to improve husbandry by selection of seeds has failed! All has been abandoned, because the first experiment has not been crowned with success—forgetting that seeds, like animals, must be acclimated, and require certain food not found in every soil. The truth of this general remark may be illustrated by a recent attempt to solve the difficulty in granulating the sirup of corn stalks. Scientific gentlemen at first pronounced the sugar from corn stalk to be grape sugar only, and hence crystallization could hardly be expected. Much disappointed in the result, I transmitted to Boston some of the sugar made by Mr. Webb, of Delaware, and requested another analysis. The second analysis was entirely successful, proving the sugar from corn stalk to be equal to the best muscovado sugar.

In reviewing this subject, it appears that the juice of corn stalk cut too *early* will not granulate; and this was the cause of the first failure.

There is every reason to believe, that all difficulties in making good sugar from this vegetable will be removed, while the reports of this year show the quantity of saccharine matter sufficient to class the crop among the best for profit.

Dr. Jackson's communication will be found in appendix No. 16 to the agricultural report.

To Dr. Jackson we are also indebted for an analysis of several grains. The superiority of one kind of Indian corn over another is surprisingly manifest. One is filled with oil, the other has no trace of it; hence the superiority of the former for fattening animals. Some grains contain a large quantity of phosphate, (such as beans, &c.;) and hence their consumption tends greatly to increase the bones of animals. Dyspeptics will learn from this why some meal (that which contains oil) is so difficult of digestion. For further remarks on this subject, with illustrations, see appendix No. 6 to the agricultural report.

A description of a new mode of fencing, and also a plan of erecting houses of unburnt brick, has occasioned more inquiries than I could possibly answer. Improvements have been made, both on the ditcher and in the construction of these buildings; and I have thought it expedient to insert in this report a sketch of a building made of this material, as well as improvements made in machinery for excavation, and forming living posts on the embankment, as the most satisfactory mode of meeting the wishes of correspondents. (See papers K and L.)

Having received from I. W. P. Lewis, Esq., a sketch of an improved railroad, constructed entirely of wood, for wheels of the same material, it is added in the subjoined paper, marked M, and will, I trust, be worthy of a trial where timber is plenty, and where funds cannot be obtained for a more expensive track.

Among the first inquiries of the political economist is the question, how can the productiveness of the earth be increased? Modern practice answers it easily. Manure and tillage are the instruments employed; either, alone, is comparatively useless. "Grapes will not grow on thorns, nor figs on thistles;" nor will sour land yield sweet food. The nature of the soil must be changed, and this is effected by draining.

Intimately connected with draining land, is that of subsoiling; indeed, the last has lately been substituted for the former with good success. The cheapness of subsoil ploughs brings them within the reach of every farmer.

The letter from Mr. Verdine Ellsworth shows what can be done by deep ploughing. By superior culture, his land yielded, this year, over 121 bushels of shelled corn per acre. His timothy meadows yielded 3½ tons per acre. This statement is full of encouragement. (See appendix No. 5 to agricultural report.)

Few individuals are aware of the extension of roots in pulverized soil. Von Thaer mentions finding roots of sainfoin from 10 to 15 feet deep in the ground. There are now in the National Gallery corn roots taken from one side of a hill of corn laid bare by the freshet, and presented by the Hon. J. S. Skinner to the National Gallery. The corn was planted on the 20th of May, and roots gathered the 14th July, 1842. In sixty days, some of the large roots extended more than 4 feet, covered with lateral branches. I have caused the roots to be measured. The aggregate of the length of the roots in a hill is, by Mr. Skinner's estimate, over *eight thousand feet.*

The specimen alluded to is open for examination. This fact is here mentioned, to show the importance of deep ploughing, to enable the plant to find nourishment so much below the surface as may avoid the effect of drought, give support to the stalk, and not expose the roots to be cut by needed cultivation. Soil is made by exposure of earth to the atmosphere; and whoever wishes to make permanent improvements will not fail to *plough deep.*

I hope to distribute to the members of Congress from 20,000 to 30,000 packages of seeds, embracing many that are highly valuable for garden and field culture. If the distribution of seeds is a matter of interest or advantage, I beg, respectfully, to suggest how the benefit might be much increased. By a circular issued from the Navy Department, the navy is instructed to bring to this country seeds that may be found, and that are deemed useful; but this order is inefficacious, because there are no funds to defray the trifling expenses of packing and shipping them. Seeds are offered, sometimes gratuitously, in distant parts of the world; at others, for a small sum. The boxing and porterage require some expense; and however small this may be in a single instance, in the aggregate it amounts to a considerable sum. None of these expenses are allowed by the Navy Department, and hence none are incurred. It is certainly to be regretted that so many fine opportunities for procuring seeds and plants should be lost; and yet the department which refuses to allow the claims mentioned must do it, if at all, without authority. To meet the emergency, it is suggested that the annual appropriation made for agricultural statistics and other purposes should be increased $1,000; and then the Commissioner of Patents, in conjunction with the Navy Department, could do much to advance national industry; and if there is any appropriation which could gratify the agricultural community, it would be this. I am happy to say that the patent fund is amply sufficient to be further charged with this expenditure.

A contract for iron railing around the portico of the Patent Office has been made, and the work will soon be completed, within the appropriation. Lead for the roof of the Patent Office building has been purchased, but did not arrive in time to be laid on this fall. The work will be done early in the spring. Both of these improvements were needed—the former to protect life, and the latter to protect the public property.

The library will require the usual appropriation, until the loss by the fire shall be restored; and considerable appropriations must be made annually, to enable this bureau to keep pace with the progress of arts and sciences. If the Commissioner of Patents were permitted to take books from the Congress library, this privilege would dispense with the necessity of purchasing some rare publications.

The great anxiety felt in the United States respecting the disease in the potato, by which whole sections of our country have been seriously affected, has induced me to devote much time to investigate this subject; and, if no satisfactory reasons are assigned for the disease, it is hoped some partial preventives, at least, are suggested. Those who are curious to read all that can be collected on this subject will find it in an appendix subjoined to the agricultural report, marked No. 9.

The Hessian fly still continues a dreadful foe to the agriculturist. Hoping to throw some light upon this subject, I have obtained a communication from one of the most scientific gentlemen in this country, who has made the

study of this insect the object of microscopic investigation for years. The origin, progress, and changes of this fly cannot fail to interest; and it is confidently hoped, that when its birth, its constitution, and its home, are found, it can be attacked with more certainty of destruction.

Mr. Herrick's communication will be found in the appendix to the agricultural report, as above, marked No. 1. Notice of other insects that affect wheat is added. (See appendix No. 2.)

There is much to encourage the artist and the husbandman. The latter may feel momentarily depressed by the low price of crops, but he is cheered by the reflection that he is far better off than those in professions proverbially crowded. The cultivator of the soil is, in the fullest sense, the most independent. He raises enough to eat, and can clothe himself; having a surplus to exchange, if he cannot sell. How much better for the young man of this country to aspire to the enviable rank of a scientific and successful agriculturist, than to grasp at the shadowy honors that are momentarily cast around the brows of political combatants.

There is much to console the husbandman in the reduction of the cost of the necessaries of life which he has occasion to purchase. Labor-saving machines are being introduced with still greater success. Mowing and reaping will, it is believed, soon be chiefly performed on smooth land by horse power. Some have regretted that modern improvements make so important changes of employment—but the march of the arts and sciences is onward, and the greatest happiness of the greatest number is the motto of the patriot. This is promoted by facilities in production, whether in manufactures or agriculture; and, if we are to compete with the world at large, we must readily embrace the offer of genius and skill; we must yield to competitors equal fertility of soil, and win the race by superior industry and intelligence.

There is, however, a dark cloud which lowers over the Republic. The incubus *debt* has lost its terrors, and obligation carries with it little self-reproach. Past experience is disregarded. The importation of goods into the United States during the last year will equal one hundred and fifty millions of dollars. Happily for citizens of this country, a portion of the goods imported have been sent on consignment, to be sold for the benefit of foreign manufacturers; and hence they must share in the loss. Still, these goods, if purchased, must be paid for in produce or specie. If importations must be increased, it is deeply to be regretted that it should take place when the value of agricultural products has so greatly diminished. Unfortunately, American stocks, once sought by foreign capitalists, are now refused; confidence is lost. The Bank of England is loaning its capital at 2½ per cent. per annum, while our State stocks, bearing 6, and even 7 per cent., are far below par. Has not the time arrived for the South and the North to commence retrenchment and practise more rigid economy? The wheel of fortune will not turn out prizes, nor can patents be granted for paying debts. These must be *worked out* in the old-fashioned way; and when the people shall take a sober estimate of life, and moderate their wishes to their circumstances, then, and not till then, will they find permanent relief.

All which is respectfully submitted.

H. L. ELLSWORTH.

Hon. WILLIE P. MANGUM,
President of the Senate.

A.

Statement of receipts for patents, caveats, disclaimers, improvements, and certified copies, in the year 1844.

Amount received for patents, caveats, &c. - - -	$41,220 06	
Amount received for office fees - - - -	1,289 20	
	42,509 26	
Deduct, repaid on withdrawals - - - -	10,040 00	
	32,469 26	

B.

Statement of expenditures and payments made from the patent fund, by H. L. Ellsworth, Commissioner, from the 1*st January to the* 31*st December*, 1844, *inclusive, under the act of March* 3, 1837.

For salaries - - - -	$15,975 00		
For temporary clerks - -	3,709 67		
For contingent expenses - -	4,443 37		
For compensation to district judge -	100 00		
		$24,228 04	
For the library - - -	663 00		
For agricultural statistics - -	1,413 49		
		2,076 49	
			26,304 53
Leaving a nett balance to the credit of the patent fund -			6,164 73

C.

Statement of expenditures on the restoration of the Patent Office, under the act of 3*d March*, 1837.

For restoring the records and drawings - - -	$2,008 32
For duplicates of models, &c. - - - - -	814 34
	2,822 66

D.

Tabular estimate of crops for 1844.

State or Territory.	Population in 1840.	Present estimated population.	Number of bushels of wheat.	No. of bushels of barley.	No. of bushels of oats.	No. of bushels of rye.	No. of bushels of buckwheat.	No. of bushels of Indian corn.
Maine - - -	501,973	555,525	628,000	260,000	1,422,000	176,000	66,000	1,738,000
New Hampshire - -	284,574	289,368	588,000	117,000	1,765,000	405,000	147,000	1,662,000
Massachusetts - -	737,699	803,187	210,000	141,000	1,687,000	660,000	114,000	2,816,000
Rhode Island - -	108,830	115,033	4,000	49,000	182,000	49,000	4,000	636,000
Connecticut - -	309,978	316,543	104,000	25,000	1,496,000	1,122,000	404,000	2,408,000
Vermont - -	291,948	297,166	776,000	49,000	3,266,000	306,000	286,000	1,440,000
New York - -	2,428,921	2,714,486	14,975,000	2,164,000	31,135,000	4,044,000	2,997,000	19,468,000
New Jersey - -	373,306	401,295	875,000	10,000	4,271,000	2,569,000	818,000	6,966,000
Pennsylvania - -	1,724,033	1,924,460	10,483,000	157,000	24,783,000	10,373,000	2,889,000	19,029,000
Delaware - -	78,085	78,527	367,000	5,000	1,035,000	46,000	12,000	3,014,000
Maryland - -	470,019	482,256	4,070,000	3,000	2,254,000	858,000	99,000	4,653,000
Virginia - -	1,239,797	1,254,938	10,805,000	94,000	14,812,000	1,310,000	-	38,960,000
North Carolina - -	753,419	761,648	2,461,000	4,000	5,346,000	255,000	-	22,330,000
South Carolina - -	594,398	606,285	1,460,000	4,000	1,400,000	60,000	-	13,640,000
Georgia - - -	691,392	891,642	1,848,000	13,000	1,190,000	80,000	-	22,200,000
Alabama - - -	590,756	657,000	1,088,000	8,000	1,909,000	72,000	-	22,200,000
Mississippi - -	375,651	556,467	344,000	2,000	1,081,000	20,000	-	2,709,000
Louisiana - -	352,411	426,160	-	-	138,000	2,000	-	7,600,000
Tennessee - -	829,210	907,770	6,950,000	5,000	7,841,000	366,000	25,000	61,100,000
Kentucky - -	779,828	828,846	3,974,000	14,000	11,901,000	2,316,000	13,000	47,500,000
Ohio - - -	1,519,467	1,834,965	15,969,000	191,000	20,393,000	840,000	792,000	48,000,000
Indiana - - -	685,866	868,175	5,419,000	32,000	11,585,000	210,000	66,000	24,500,000
Illinois - - -	476,183	764,809	3,380,000	92,000	10,798,000	136,000	86,000	19,680,000
Missouri - -	383,102	514,000	1,144,000	10,000	4,555,000	77,000	17,000	12,500,000
Arkansas - -	97,574	133,403	2,111,000	1,000	396,000	11,000	-	7,500,000
Michigan - -	212,267	308,437	4,237,000	158,000	4,013,000	70,000	200,000	4,300,000
Florida Territory -	54,477	65,005	1,000	-	10,000	-	-	1,100,000
Wisconsin Territory -	30,945	52,379	728,000	17,000	1,000,000	4,000	23,000	560,000
Iowa Territory - -	43,112	90,000	595,000	2,000	568,000	7,000	13,000	1,690,000
District of Columbia -	43,712	52,421	13,000	-	15,000	6,000	-	44,000
	17,069,453	19,552,196	95,607,000	3,627,000	172,247,000	26,450,000	9,071,000	421,953,000

TABULAR ESTIMATE—Continued.

State or Territory.	No. of bushels of potatoes.	No. of tons of hay.	No. of tons of flax and hemp.	No. of pounds of tobacco.	No. of pounds of cotton.	No. of pounds of rice.	No. of lbs. of silk cocoons.	No. of pounds of sugar.	No. of gallons of wine.
Maine - -	12,304,000	1,251,000	-	-	-	-	850	266,000	
New Hampshire -	4,643,000	657,000	-	-	-	-	1,100	1,928,000	
Massachusetts -	4,050,000	706,000	-	108,000	-	-	37,690	425,000	
Rhode Island -	812,000	44,000	-	-	-	-	1,140		
Connecticut -	2,117,000	573,000	-	661,000	-	-	176,210	47,000	
Vermont - -	6,158,000	1,266,000	-	-	-	-	10,990	4,383,000	
New York - -	17,703,000	4,938,000	-	-	-	-	6,540	12,135,000	
New Jersey - -	2,067,000	376,000	-	-	-	-	5,200		
Pennsylvania -	6,871,000	2,182,000	-	486,000	-	-	33,100	1,313,000	
Delaware - -	194,000	23,000	-	-	-	-	4,580		
Maryland - -	881,000	80,000	-	582,000	6,000	-	8,530		
Virginia - -	2,374,000	444,000	-	83,574,000	2,683,000	3,000	7,720	1,407,000	
North Carolina -	3,615,000	134,000	-	466,000	51,628,000	3,823,000	8,050	8,000	
South Carolina -	3,360,000	31,000	-	53,000	49,700,000	83,616,000	6,930	28,000	
Georgia - -	2,048,000	22,000	-	163,000	213,620,000	17,524,000	7,660	291,000	
Alabama - -	1,923,000	21,000	-	310,000	140,000,000	200,000	7,170	9,000	
Mississippi - -	3,378,000	1,000	-	176,000	195,240,000	1,144,000	270		
Louisiana - -	1,443,000	33,000	-	-	154,800,000	4,705,000	1,310	160,000,000	
Tennessee - -	2,051,000	52,000	-	33,736,000	39,600,000	10,000	25,090	460,000	
Kentucky - -	1,371,000	164,000	12,000	57,555,000	880,000	19,000	5,810	2,447,000	
Ohio - -	4,847,000	1,876,000	1,000	6,888,000	-	-	31,500	4,380,000	
Indiana - -	3,573,000	2,027,000	500	3,200,000	-	-	1,050	7,365,000	
Illinois - -	3,095,000	350,000	300	1,062,000	250,000	-	4,250	542,000	
Missouri - -	972,000	90,000	9,000	12,495,000	180,000	-	260	396,000	
Arkansas - -	611,000	1,000	-	-	14,400,000	7,000	270	3,000	
Michigan - -	5,359,000	268,000	-	-	-	-	1,730	2,611,000	
Florida Territory -	300,000	2,000	-	195,000	9,120,000	708,000	510	373,000	
Wisconsin Territory	853,000	67,000	-	-	-	-	030	216,000	
Iowa Territory -	469,000	34,000	-	-	-	-	-	74,000	
District of Columbia	51,000	2,000	-	-	-	-	1,250		
	99,493,000	17,715,000	22,800	151,705,000	872,107,000	111,759,000	396,790	201,107,000	

REMARKS ON THE TABULAR ESTIMATE.

The foregoing table embraces results which are founded on the same general elements of estimate as were described in the reports of the two preceding years, and which need not be here repeated with particularity. It cannot be expected that in every case we should be able to arrive at correct results. Many things enter into the judgment of those on whose information we must in no small degree depend, which will cause variations of opinion respecting the same crop in any particular district of country. Even in the case of the census, taken by persons especially appointed and sworn to the faithful performance of their duties, we find that perfect reliable accuracy is not always to be obtained. It could therefore hardly be expected that, in holding a fair balance between conflicting opinions, and thus deciding upon even an approximate estimate of the different crops, great difficulty should not be experienced.

Subsequent information may sometimes enable us to correct former data, and thus give a nearer approach to truth in particular cases; and no pains have been spared to accomplish so desirable a result. Some success has crowned these efforts, and an advance, it is believed, has been made in this respect in the present report. An error has crept into the tabular estimate, and has been continued down from 1841, in dropping the millionth period in the crops of Indian corn and sugar of New Hampshire. This has been corrected in the present report. A great mass of information has been collected from a variety of sources. Public journals from every quarter of the country, including accounts from between 25 and 30 agricultural papers, have been carefully examined, and whatever related to the prospect or appearance of the crops, from the beginning to the end of the season, has been gleaned out and treasured up. These notices have been digested and imbodied with such other knowledge as could be obtained from personal conversation and observation, as well as from the circular sent from the office to numerous individuals who were presumed to be able to afford aid in effecting the object in view. On this account, and because not the exact language is sometimes employed, it is not easy at all times to give the credit to the sources of our information; and it is hoped that this will be remembered by the editors of the public journals, should they recognise the scraps which have been here and there cut from columns, and interwoven with others of various kinds.

The columns in the table, for greater convenience, have only been filled, in most cases, with round numbers, leaving off the fractional parts, which were retained heretofore because they were originally found in the census returns, which were made the basis in the outset of constructing the tabular estimate. In the case of the estimated increase of population, we have adopted the actual census, as mentioned in some of the public journals, with reference to the States of Alabama and Missouri, and Wisconsin and Iowa Territories.

Further: in forming the columns of the table, with regard to the crops, reference has likewise been made to a variety of causes, which must more or less influence the state of the markets, as well as also the fact of the attention being directed to particular crops. It is well known that now and then a favorite crop, for reasons either apparent or otherwise, loses its interest with cultivators, and the industry before devoted to it is directed to some other crop or pursuit. The quantities raised in a section of the country, or generally, should the cause prove more extensive, falls off, and thus

the aggregate amount is lessened. A familiar instance of this is the case of some of the grains which have been formerly used in the distillation of spirituous liquors; the comparative growth of which has been checked by the stricter regard for the habits of temperance which have happily become so much more prevalent.

It would be a great mistake, also, to disregard the continued advance of agriculture by the means of improvement which are so steadily cherished by an increasing body of our intelligent farmers. There is a beautiful connexion between the progress of the mechanic arts and the development of the natural productions of the soil. The genius which puts into the hands of the agriculturist the machine by which he may plough, mow, reap, thresh, or shell out, ten times the usual amount performed by the same number of individuals, of course is gifting him with increased power of turning his labor to advantage, provided the market keeps pace with such advance of product. The same may be said with respect to the great fertility secured by different compounds, which, by the aid of chemistry, have been applied to the soil. The farmer may thus often spare himself much hard toil, while he is at the same time enabled to reap the more surely the fruit of his labor. These changes are not so apparent from one year to another as by taking a survey of the state of things at an interval of perhaps some ten, fifteen, or twenty years, or more.

Thus, to go back and retrace the appearance of implements of agriculture, the modes of tillage, and the various relations of stock, breeds, seeds, and manures, to the farmer's domain, we are struck by the improvement which has been obtained. And if we go back still further, to the days of our Saxon ancestors, it would appear from the ancient manuscripts that the ploughs used then were as simple as those used in modern India; and at as late a period as 1634, we learn that, in Ireland, by the act of 11 and 12 Charles I, an act was passed to this effect: "An act against ploughing by the tayle, and pulling wool off living sheep."

Much of this improvement secured is due to the enterprise of individuals in various sections, who have set in motion agricultural societies and journals, imported seeds, animals, &c., from abroad, as well as to the inventive power of the industrious artisan, who in too many instances finds but a small return for his pains in contributing to the prosperity of the sons of the soil. The farmer should recollect, that for his plough, his harrow, rake, spade, and scythe, his reaping, threshing, and winnowing machines, &c., he is indebted to the mechanic; and just in the degree in which these instruments of his toil are improved, may he find additional ease and comfort in his method of conducting his business. No unfounded jealousy or prejudice, therefore, should prompt him to look with an evil eye on the advancement of the mechanic arts; but he should hail and encourage their progress, as auxiliary to his own increased means of adding to his ease of living and rational enjoyment. By the use of these various tools, which are such interesting exhibitions of inventive talent, too, his own mind may be expanded, as he learns to observe their operation, and so obtains knowledge of the practical laws of the forces in action, and, thus quickened to invent for himself, may be able, by suggestions of his own, to derive increased advantage from what he reads or hears.

Similar remarks may be made with reference to the practical operation of books and journals, when rightly appreciated. The prejudice against book farming is happily more and more passing away, though there is still too much of it remaining; but, compared with some twenty years back,

there is a vast deal more information of this kind possessed than formerly. The consequence is, that information is more diffused; the minds of the farmers are set in action; many become contributors to the agricultural journals, and the value of these latter are much heightened by the increased practical bearing they assume, and the extent and variety derived from these sources. A comparison of these papers at the present day with those published some twenty years since will show how far the science and art of agriculture has advanced in this period.

The prejudice which improvements suggested by science have sometimes to combat is well described, though somewhat sarcastically, in the following extract from the *Revue Scientifique*, in an article on manures, which we take from an agricultural journal. The writer says: "Among others, we recollect the jokes, the epigrams, the vituperations, uttered upon Darcet, Camille Beauvais and his pupils, a few years ago, because they had the audacity to make the raising of silk worms a scientific affair. 'What!' said they, 'does not the south of France know how to raise silk worms, after having tried it for centuries? Is it in the south of France that the fine folks know all about silk worms, because they have raised *four worms in a little desk?* Oh fie! Mr. Darcet! Mr. Beauvais! You are mere theorists! You are mere parlor farmers!'

"However, (thanks to their noble studies!—thanks to their perseverance!) the silk culture of the south of France is wholly regenerated. They now can work at it almost with certainty of success. *Their production of silk is already doubled,* and all the former chances of loss are diminished *one-half.*"

Mr. Colman's Observations on European Agriculture, in the course of publication, under a liberal patronage, may very probably add to the stock of knowledge, by contributing much material relating to the economy of the farm, based on long and careful experience, directed to the aim of increased improvement.

It is gratifying to observe, in the examination of the notices and reports of the numerous agricultural societies, the very decided advance which is making in the various departments of agricultural labor. The premiums, either intrinsically valuable or merely honorary, have stimulated honest industry, and in many cases tracts comparatively barren have been rendered fruitful, and difficulties which seemed insurmountable have been readily overcome. It augurs well for the hope of future extended benefits, that the number of those associations is increasing; and the numerous records of the productions of the soil, the dairy, the orchard, farm yard, and household, thus presented, show that the attention directed to these objects is not without effect. The gain of many parts of our country, in consequence of these means, is estimated by good judges at not less than 20 or 30, and even as high sometimes as 50 per cent. Large crops, improved farms, and better seeds, implements of agriculture, manners and modes of application, are the happy results of the diffusion of a generous spirit of emulation thus encouraged. A great variety of most valuable records are secured, which serve as comparative references, and detailed successful experiments may furnish the ground for many more. As a single instance, we may mention that the New York State Agricultural Transactions contain, beside various valuable treatises, reports of 46 county agricultural societies. The geological reports of State surveys are likewise increasing in interest. Among the latest of these may be mentioned Doc-

tor Jackson's, of New Hampshire, and Mr. Ruffin's, of South Carolina, both of which are highly meritorious.

The State of Alabama, likewise, has recently ordered a geological survey, by which, no doubt, the resources of the State may be developed. A recent foreign paper speaks of an agricultural convention held at St. Quentin, in the north of France, by the proprietors, which might be very profitably imitated on an extensive scale in our own country. It was attended by the deputies, members of the councils general, and upwards of three hundred practical farmers, who passed three successive days in discussing the best means of improving the breed of horses and cattle of all kinds, the growth and importation of oleaginous seeds, wool, hemp, and flax, the cultivation of waste lands, and other important questions. It was also decided that a general association of the northern departments, similar to those in Normandy and Brittany, should be formed, and its first meeting should be held next year at Cambray. We cannot doubt that such measures among us would have a most happy effect in diffusing intelligence on important agricultural subjects; and it is to be hoped that many years will not elapse before the conviction of its beneficial effects will prompt to the enterprise. The great Father of his Country, who watched with an eagle eye for her welfare, earnestly recommended means for such an object, the benefits of which would be realized, as he says, "by drawing to a common centre the results every where of individual skill and observation, and spreading them thence over the whole nation."

Another cause, which deserves to be considered in forming the estimate, is found in the effect of a rapidly increasing population in portions of our country. In some of the new States the lands are becoming yearly more and more brought under tillage. Thousands of acres thus add to the amount of produce; so that the effect of the season, even in the years which are most unpropitious, is in some degree repaired.

The number of persons landed in this country as emigrants, during the past year, is said to have been 84,674. To take a single instance, by way of illustration: It appears, by the census of last spring, that the population of Iowa amounted to 82,000; and allowing to the estimate 10,000 increase a year, for the last three or four years, which is said not to be too large, it now amounts to not less than about 90,000. Of course, as most of these are agriculturists, there must have been a very considerable increase of the quantity of land thus brought under cultivation in that Territory. The same may be said of Arkansas, Missouri, and some of the other more recent States. This will affect the particular crops raised in those States. Besides this, there are other lands in the process of clearing up, which, for the first time, each year receive and produce a crop. These add very considerably to the amount. Notwithstanding, too, the low prices of the markets and the great surplus of produce, there is still a disposition to increase the amount sown, in the hope, it may be, of some favorable change in the demand for the product. All these things tend to make up for losses from other causes; so that, on the whole, there is no sensible diminution in many of the most important crops.

THE SEASON.

An attempt has again been made to estimate the influence of the season, by collecting notices of the state of the weather, from the earliest periods in which the various crops could be supposed to be much affected by the diversity of the same.

An extensive examination has been entered into; and by comparing the journals of one month with another, published in many parts of the country, the following conclusions have been reached:

There appears to have been no very extensive injury from the effect of the cold winter or spring, though we meet with occasional notices of the grain being winter-killed. Nothing like uniformity can be expected in so widespread a territory, embracing many degrees of latitude. While winter reigns in one section, spring may be breaking in another; and while heat is drying up the ground in one, in another refreshing showers may revive the drooping vegetation. A kind Providence has thus guarded us from the severity of either extreme of our climate. Seldom is it that we are called to notice any meteorological cause which has affected the whole country. During the past year, there has been, as usual, important alternations of the weather. Partial damage is now and then noted, as resulting from the occasional frosts of spring extended into summer; but the injury has been quite limited. Thus we find notices like the following:

Michigan City, Indiana, May 21.—"Last night we were visited with one of the severest frosts ever witnessed here at this season of the year. Destroyed corn, potatoes, vines, &c., and all kinds of fruit, and actually freezing the ground in some places. It is confidently asserted by some farmers to-day, that the wheat is greatly injured, if not in some sections entirely ruined; the truth of which I cannot decide, but a few days will determine."

Marshall, Michigan, May 23.—"For some days past, it has been cold and rainy; but on Monday it cleared up, and we were visited on Monday and Tuesday nights with very severe frost, which has doubtless destroyed all kinds of fruit in this region."

In other sections, at this early period, apprehensions are expressed on account of the want of rain, and yet in others rain was most abundant. Thus:

Greenville, South Carolina.—The prospect of fine crops was never more flattering in the upper districts than at this time. In some neighborhoods, however, they have suffered severely from drought, and immediately under the mountains from too much rain. The wheat crop produced abundantly.

Cassville, Georgia.—For eight weeks we have had scarcely sufficient rain to lay the dust. Crops are in a bad condition. The oat crop is entirely ruined. The wheat and corn corps will be cut very short.

Natchez, May 4.—"Unquestionably, and beyond the shadow of doubt, the prospect for the crops now planted has not been as unpromising for twenty-five years. We have had the longest and severest drought ever known at this season, causing a complete check to vegetation. There is nothing in the fields for insects to feed upon, and consequently the cotton is cut down by worms, caterpillars, and grasshoppers, as soon as it makes its appearance through the surface. Thousands and thousands of acres are now being ploughed and planted over, and the demand for cotton seed is great—so great, that one dollar per bushel has been paid for large quantities. We plant about two bushels to the acre."—*New Orleans Picayune.*

It is certainly singular, that while the planters on the Mississippi are complaining of the drought, and many of them despairing of making any thing like an average crop, those in the western part of Arkansas are in a predicament nearly as bad, from too much wet weather. The Van Buren Intelligencer of the 4th instant says: "Perhaps there have been few seasons more unpropitious to the farmer than the present. Rains have been

frequent and excessive for two or three months, and the creeks and streams have been so extraordinarily high, that intercommunication has been nearly cut off. We have heard that several mills have been swept away, and many farmers have not yet planted their corn. As for those on the river, they have nothing ahead but the prospect of an overflow, or actual ones where the land is low."

In the northern section of our country, for the most part, the earliest period of the summer was favorable. In Iowa, however, we find mention of an immense quantity of rain in June. Such was the case in Illinois and parts of Indiana and Missouri, by which the Mississippi and its branches were much raised, and vast injury done. Large tracts of country on the Mississippi and its branches had their crops destroyed by the overflow. In some parts of the South, the rains were likewise severe, while in other parts the drought exerted a withering influence. Thus it is said—

"*Parish of De Soto, August* 30, 1841.—It is impossible to give you any thing like a correct account of the loss occasioned to the cotton planters here by the late severe seven weeks' drought. To my knowledge, crops in this immediate vicinity are reduced from 1,200 to 550, and even 400 pounds weight per acre, owing to the plant shedding the bolls; and it is too late in the season now for new growth to mature and yield. The products of cotton in the three parishes of De Soto, Natchitoches, and Caddo, taken collectively, are cut short nearly one-half." Again, at

Cheraw, South Carolina.—"This present month of July will be noted for intense heat and protracted drought. The surrounding country has suffered incalculably for the want of rain. The corn crop is materially affected, and even cotton, which up to within a few days promised a most abundant yield, has commenced shedding its bolls to an almost incredible length."

Dr. Cloud, of Alabama, says: "We experienced a most injurious drought in the early part of summer, which we supposed for a while had cut off the crops one-half."

In some parts of the country, in July, the pastures and crops suffered from heat. Thus, a letter from Philadelphia of the 16th, says: "In riding 50 miles in the country, we noticed the pastures drying up in every direction, &c. Towards the latter part of summer, in the months of August and September, especially of September, we find great complaint of a most extensive drought along the whole Atlantic coast. Considerable streams were dried up, and great fears were entertained for some important crops."

Notices like the following are frequent:

The Bangor (Maine) Courier says: "We learn that in some of the interior towns of this county the drought is quite severe, many of the springs and brooks being dried up, and the cattle suffering."

The Farmers' Monthly Visiter, of September 30, published in Concord, New Hampshire, says: "The month of September has been both dry and hot. Indeed, there has been very little rain since July; and for the last twenty days the streams have been dried up, the springs and wells below the surface have failed, and the earth has become like powder for several inches."

Again, a Boston paper says:

"Dry weather has now continued several weeks, and vegetation is withered and parched, and our wells and cisterns are getting low, while butter and other necessaries of life are getting high. The streets and roads in the vicinity of Boston are enveloped in clouds of dust. Grapes are be-

coming prematurely ripe, and the hills and rivers in the interior are almost dried up, which of course diminishes the power of the water, and checks the speed and puts a full stop to many mechanical and manufacturing operations."

The Albany Argus says: "The country in this vicinity begins to be fairly baked with drought. Springs are so far dried up in the back towns in this county, that farmers are compelled to go half a mile to water their cattle. This drought exceeds any thing we have had since the summer of 1841. As might be anticipated, the river is very low; the weather also continues very warm."

In a Rochester paper is the following description: "We are in the midst of an unparalleled drought. The earth in city and country is as dry as a powder house. Vegetation of all kinds looks as though it had been hissed by fire. We have had but two or three showers during the last four or five weeks, and they were light. The bed of the Genesee is nearly bare, and most of our mills are idle for want of water. Many of the wells in the city are dry, and all of them are unusually low. Our principal public houses are not only obliged to go over a mile for every drop of water they use for cooking and drinking, but have *to pay for it by the barrel.*

"Many of our farmers have already sown their wheat, but the seed will be a long time in germinating, unless we are favored with rain. The warm weather has hastened the ripening of corn, which is now entirely out of danger from the frost."

"The protracted drought under which the country is suffering has so dried the streams that the mills at Paterson have not, for the last few weeks, run at more than half speed, and one or two had to stop entirely for want of water. The Paterson Intelligencer states that the quantity of water in the Passaic is less at present than it has been since 1819. Not a drop has passed over the falls for some time. Little or no business is done on the Morris canal, for want of water."—*Newark Daily Advertiser.*

"We learn that, so great has been the drought in the interior, that some of the transportation lines to Pittsburg have stopped running their boats until the canals are replenished with water. The Schuylkill, at Fairmount, is now lower than it has previously been since the dam was constructed."—*Philadelphia North American.*

"The surrounding country," says the Philadelphia Ledger, "is suffering severely from the long-continued dry weather. At Tinecum, but a short distance below the city, it is said that not a drop of rain has fallen for the last three months."

The Alexandria Gazette says: "The drought is most excessive and injurious. A ride across the country, on Thursday last, in Maryland, from the Potomac to the Patuxent, gave us an idea of what actual *suffering* there is on account of the want of rain. Nothing like it has been seen in this section for many years, if at all."

The Richmond Compiler says: "No rain yet in this section of the country, and we learn there is great suffering in a large section of the country between this and the Blue Ridge. It is now, we believe, a month since we had rain, or more than the merest sprinkle. Even the trees seem to be affected—the foliage of many of our city trees displaying the sere and yellow leaf. During the greater part of the drought, the weather has been excessively warm, and the heat of the sun so great as to parch and blight all vegetation. Our markets exhibit the sad effects of this in a striking degree.

"The Norfolk Herald is rejoicing over a rain, which appears to have been much needed. It says the rain was very seasonable to the farmers, and has doubtless raised the water in the canal, which, owing to the almost unprecedented drought, had previously decreased so much that several vessels were detained at both ends, for want of a sufficient depth to carry them through.

"The drought above the falls, at James river, except in neighborhoods favored by partial showers, has been most afflictive and, for the period of its duration, severe beyond example. The corn crop, until it got into the roasting-ear state as promising of a superabundant harvest as it could be, has been in various quarters of the great region between the head of the tide and the Blue Ridge, immensely curtailed—possibly one-half, and in many cases three-fifths, or even three-fourths; leaving it questionable if a crop, which, in July, promised to bring corn down, for the first time, to $1 25 per barrel, will now make bread for the country. This is more especially, according to our information, true of the south of James river—perhaps equally true of the north side, after entering, twenty miles above this, the region which Volney predicted, when he passed through it, would, one day or other, from drought, become another Arabia Deserta.

"A gentleman, who has recently been in Orange county, North Carolina, informs us that the crops between this city and Hillsborough are very indifferent, having been told by the planters on the road that scarcely half a crop will be averaged. It is attributed to the drought, which continued for several months, at a season when rain was most needed."

"The weather," says the Greenville (S. C.) Mountaineer of the 13th instant, "during the past week or ten days, has been oppressively hot, dry, and sultry—the thermometer ranging from 90 to 92 degrees in the middle of nearly every day. The streets and roads are so dusty that travellers and others suffer severely from its effects. The watercourses are unusually low, and many wells and springs in the upper country have entirely failed. In fact, we have had the longest, most dry, and hottest summer experienced in twenty years. Since the first of February last, there has not been sufficient frost in this region to injure vegetation, and not rain enough thoroughly to wet the ground."

"The present drought," says the Georgetown (S. C.) Advocate, "exceeds in length of duration, and consequently severity, any that can be remembered for twenty years. Every vegetable, from the stately poplar to the lowly esculent, looks shrivelled and sapless. Late potatoes, in this region of country, will be a total failure; and whilst our Yankee providers are packing up for market those serviceable and popular roots, let them not forget to add also as many cabbages and turnips as they can spare."

A notice in a Tennessee agricultural journal, under date of September 26th, in referring to the Tennessee valley, says, of the first eight months of 1844: "January was wet beyond precedent, and more land covered with water at the end of this month than ever before known. February was dry and mild, and enabled the planter to gather much cotton that we thought could never be gotten out. March, an average month. April dry, with the exception of two light showers about the 15th, barely sufficient to bring up the cotton. May, dry and warm to the last few days; thermometer as high as 88 degrees on the 15th. June, rain every day or two through this month, which advanced the crop by the end of the month to over average size. July, dry and warm, except a day or two in the be-

ginning. August, dry and hot throughout; thermometer ranged from 94 to 100 degrees. September, dry and warm to the 15th, then a good general rain, dry since to date."

From the following extract, it would appear that the quantity of rain which fell throughout the summer of 1844 was not quite two-thirds of the mean, and but little more, it is said, than one-half of the five preceding summers: "A writer in the Providence Journal gives a table showing the quantity of rain that has fallen in each of the last thirteen years, between the 21st of March and the 21st of September, from which it appears that the quantity this year has been only 11 inches and 55 hundreths; whereas, the mean of the whole thirteen years was 18.35. The smallest previous quantity was in 1836, 11.69; the greatest in 1834, 25.32.

"The mean quantity for the whole of the thirteen years was 36.85, the greatest being in 1843, when the whole year gave 42.40, and the least in 1835, when the amount was 30.06. The quantity fallen so far in this year (1844) has been only 21.45."

Happily, however, the evil resulting from the drought, though severe, did not ultimately prove so great as was anticipated. Yet there was, no doubt, a very considerable degree of loss. The tobacco crop, corn crop, and some others, were lessened from what they would have been on this account. The potato crop, too, may have been very sensibly affected by it, and possibly the disease which has been so destructive of this crop in portions of our country, and which will be fully considered in its place, may be in a great degree attributed, in the circumstances in which it occurred, to this cause.

Comparatively less damage has been experienced from insects than has often been the case.

The weevil, which sometimes has been very destructive, seems to have somewhat disappeared in certain regions.

On the other hand, some new insects have been noticed, as will be seen by allusions under the respective crops.

The fly, which is the most threatening enemy of the whole crop, still continues to commit its ravages, though perhaps more confined in its range during this year than the previous one.

It is said to be a fact, and it is not a little curious, that insects destructive of the crops proceed from the northeast to the west and south. Such has been the case of the Hessian fly and the weevil.

Myriads of locusts are mentioned as having been seen in the early part of the summer in Wisconsin. No serious damage, however, appears to have been experienced from them.

The rust has been less injurious also than during the former year, though, as may be seen under the proper head of the grain, in some sections the crops suffered from its ravages.

WHEAT.

The greater portion of this important crop is raised by some ten or a dozen States. In two of the States or Territories this produc scarcely deserves mention. In one of the New England States, also, the amount is comparatively trifling.

Ohio takes the lead of all in the wheat crop, then follow New York, Pennsylvania, Virginia, Indiana, Tennessee, &c.

Out of a mass of materials relating to this grain, we have selected the following records of the progress of the wheat crop:

From all accounts, in the great wheat-growing States, the country over, there was an immense breadth of land sown; and had it all ripened, and if it had been gathered, the crop would have been probably superior to that of any former year.

Little injury, in comparison to that of some years, was sustained by its being winter-killed, and the spring in many sections opened with fair promise.

As early as the 17th of May, we find the following statement respecting the crop in Ohio, within the vicinity of Cincinnati:

"From inquiries which we have been making for a couple of weeks past, we are led to believe that the crops of grain within a circle of sixty to seventy miles around Cincinnati have very seldom if ever promised more abundant yields at this season of the year than they do now.

"Generally, the wheat crop looks healthy, and is of most luxuriant growth. In the great Miami valley we are informed this is particularly the case, and similar statements have been published respecting the Mad river country. We learn from a gentleman from Middletown, well informed in all such matters, that in the large rich farms of Butler county about one-third more wheat was put in last fall than the year before—and this without at all trenching upon the strong corn lands of the bottoms, which will be given as usual to the production of food for pork. The wheat looks extremely well, and is as yet free from every manner of disease or vermin."

In another part of the State, the account under the same date is not equally favorable:

"*May.*—We regret to learn that this staple crop, which during the early part of the season promised so fairly, is now suffering considerably from the ravages of the fly. This is said to be the case in the Buck creek settlement. We have heard of three fields adjoining, the middle one of which remains uninjured, while the other two have been destroyed. Where such facts are noticed, it would be well to institute an investigation into the cause of the difference, and furnish the result for publication."

A month later, the wheat crop in many parts appears not to be equally promising.

Thus it is said, early in June:

"The grain crops throughout this and the adjoining counties promise an abundant harvest, though injured in places by the flies; yet, we understand that there will be more than an average crop."—*Miami of the Lake, at Perrysburg.*

"The fly is certainly making much greater ravages than we anticipated. Never has this section experienced so great destruction from the fly before. Whole fields are entirely destroyed. How much it will affect the aggregate crop is difficult to say. The quantity on the ground is doubtless greater than any former year."—*Massillon Gazette.*

The Sydney (Ohio) Aurora says: "Wheat has not looked better here for many years. The great danger apprehended is, that the forward state of the crop and the wet weather will cause the wheat to fall before it is ready for harvesting."

"*Chillicothe, June* 17, 1844.—It has rained almost incessantly for the last six days. The wheat is prostrated, and the rust is taking it. With all

the boasted prospect of good crops, I consider the chances five to one for its total destruction. Ten days hence, the tone of the newspapers will be totally different from what they have been for some weeks past. The cry now will be, and justly so, *no wheat.*"

"*Toledo, June,* 1844.—The present appearance of the new wheat crop is not as favorable for a fine crop as formerly. The fly and extreme wet weather will no doubt lessen the crop, in northern Ohio and Indiana and southern Michigan, at least one-third."

These injuries were not, however, universal, as we learn by the following notices from the public journals:

The Cincinnati Atlas, under date of June 17, speaks of the "prospect of a good crop in the Miami valley;" that the "harvest never began so early;" and that, "though the weather was such as to induce rust, the grain was so ripe that no injury was feared."

Again: The Chillicothe Gazette, of June 27, states "that great progress has been made in gathering in the grain, the season being two weeks earlier than usual; the weather very hot. All things are, however, favorable to the harvesters."

The Zanesville Republican mentions "that the wheat crop will be large—more than an average. Early sown has escaped the rust; later fields somewhat injured by it. The harvest commenced about the 22d. The season in the vicinity of the lake is considerably later than in the central portions of the State. In the vicinity of Cleveland, the harvest is not commenced, though the fields begin to exhibit a golden appearance."

The Cincinnati Chronicle says: "The wheat this year in Ohio is as good, and more in quantity, than in any other year whatever. The result we arrive at both from what we saw and what we heard. A gentleman informed us that in Pike and Scioto counties there was more than four times the usual quantity of wheat. In Meigs and Washington, the quantity of wheat sown is large, and the quality good. Here and there a field is rusted, but not to such a degree as to materially injure the crop. The same general statements are made in other portions of the State. The wheat crop of Ohio in 1844 will therefore, in our opinion, be almost twenty millions of bushels, which is an advance of twenty-five per cent. on the crop of 1839—no more than a proper allowance for the increased quantity sown."

July.—"The farmers in this vicinity have commenced their labors in the harvest field in good earnest. The storm on Thursday prostrated most of the wheat that had been left standing by previous storms. The wheat is very heavy on the ground, and if got in safely the crop will be a large one."—*Columbus (Ohio) Journal.*

The wheat crops of Jefferson and Columbiana counties, also, are mentioned in July, in a public journal, as being "of the most promising aspect."

The general result is likewise stated in another account—that, beyond Harrison, and entirely through to Indianapolis, the wheat crop is not only gathered in fine order, but is unusually large, exceeding any thing before seen in that quarter. Its weight will average 60 pounds; and fields yielding crops that, in the green state of the kernel, weigh 62 pounds per bushel, are not uncommon. In Whitewater valley, also, it is said to be uncommonly fine. There are contradictory accounts, however, of a later date.

Thus: one writer states, as the result of his judgment, that the wheat crop in Ohio is said to be generally injured by rust. Others, speaking of their own knowledge, say the wheat crop is very good, uncommonly large.

In Muskingum county, one writes, in August, that the wheat did not fill well; the straw was heavy, but the wet weather made it lodge; that there was considerable rust, though the hill-land wheat was good, and there was also more of it.

The information we have been able to gather of a subsequent date is of a similar diverse character.

Thus, on the southwest, bordering on the Ohio river, and above, it is said there is "but a half crop." Again: somewhat further east, in the same direction, it is stated, by a good judge, that there was more than the usual quantity sown; but the yield, both as respects quality and quantity, was a very poor one, and some estimate it at not more than half a yield. Taking into consideration the amount sown, it would be correct to estimate it at about two-thirds of last year. It promised very finely through the spring and early part of summer, but was very much injured by rust, which was probably occasioned by wet weather. In the central part of the State, the crop is thought to have been "about an average one;" perhaps 10 per cent. better. In the northwest, central, it is likewise an average crop. Still further northwest, bordering on Michigan and Indiana, an informant says: "Wheat has not yielded but about two-thirds of the usual crop, in consequence of the extraordinary wet season. In many places it was destroyed by water; and in others, the wheat, although a large growth of straw, filled but poorly." In the southeast, it was injured by the rust, and is supposed to be at least 25 per cent. less. Northward from this last, in a central direction, we find it stated, that "the wheat crop fell short this year at least 25 per cent. from what it was last year, when it was an average one, and probably 50 per cent. less than it would have been if it had not been damaged. The failure in this section is believed to be owing to uncommonly warm weather about the time of its blossoming and of the grain filling.

In the region north of the Scioto, on the lake, it is estimated that "the amount sown was fully equal to that of 1842; the weather was good, nor did the fly affect it much." The crop was gathered early, and in fine order. The universal reply to inquiries is said to be, "good;" better than usual; and probably it was 25 per cent. above that of 1843, besides there being a great improvement in quality. This description is said to be applicable to the region north of the Scioto, Miami, and Tuscarawas valley. Little or no rust appeared in northern Ohio. In the northeastern section of the State, it is mentioned, in an account of this crop, that in the spring and fore part of the season the wheat crop promised more than an average. The growth is said to have been uncommonly large and rank; but shortly after it was filled, and the kernels had come fully into the milk, it was struck by the rust; and it is believed by many farmers that the crop was one-quarter less than it would otherwise have been; but, owing to the large quantity put into the ground last fall, the amount raised will be about an average with the crop of former years. The variety of wheat called the Baltic escaped rust, and gave a fine yield. One person mentions having raised a bushel and a half from a half pint of seed sown two years ago, and the next year hopes to raise all he needs for seed, and intends to adopt it.

After this survey of conflicting accounts, it is somewhat difficult to form an opinion as to the general crop of wheat in Ohio for 1844. Taking into view, however, that in the most important wheat-growing districts this

grain was more or less injured, considerable deduction must be made; while, on account of the greater breadth of land brought under tillage for this crop, this deficiency will be nearly balanced, so that it will not vary a great deal on the whole from the crop of the previous year, and perhaps may be estimated at about 15 per cent. less.

In an agricultural paper lately established at Cincinnati, and received since our estimate was formed, we find an article on the wheat crop of Ohio, from which we take the following extracts, as aiding still further in the estimate to be made of its product for the year 1844. The writer, one well fitted to judge, says: "The number of acres in wheat was greater than ever before, but the aggregate yield was still less than the year previous. We have made considerable inquiry, and are sure that the last year's crop is less than that of 1843; that there is considerable increase in the western part of the State, but that is not sufficient to make up for the general deficiency elsewhere. The number of acres now annually devoted to this crop in Ohio is about two millions; and the average product, taking the whole State together, and one season with another, is only ten bushels per acre."

In the western part of the State, especially on new lands, there has been a considerable increase of the wheat crop for a year or two past; but this does not lessen the importance of the great facts which we wish to impress upon the minds of the farmers of Ohio, viz: "*that their great marketable staple, the* WHEAT CROP *of the State, has been annually* DECREASING *for a number of years past, especially in the amount of its acreable product.*"

Taken as a whole, the wheat crop of New York appears to have been more prosperous. In the early part of the season, in May, the crop in Genesee county and that region is stated to be fine, "never finer," and that the farmers were compelled to reap off *the top, for fear of the wheat growing too rapidly.*

Again: The Dansville Republican of the 19th says: "We are informed by farmers in this section that the wheat in the ground promises better this spring than it has for many years; and we believe it appears equally well throughout the Genesee valley. If the weather should continue as favorable as it has thus far this season, there will be an abundant crop and an unusually early harvest."

In July, a similar account is given of the grain in the Genesee valley, one of the great wheat-growing districts of New York. Along the lake shore, a writer remarks, it was thought that it would average twenty bushels to an acre, though in some fields the rust was visible. In the vicinity of Buffalo, it is said, also, under date of July, that the wheat crop was secured in good order. The harvest was two weeks earlier than usual, and would give a large surplus—one-third more than in 1843. As a general thing, more wheat is now raised on an acre than was of corn five years ago.

In the latter part of July, under date of Rochester, we are told that the wheat crop is fine; in some sandy places injured by the fly, especially the early sown. When sown before the 10th of September, it was thus more or less injured. Similar statements are made in the papers respecting this region; and the crop is pronounced to have been generally good; better than for many years. In some late-sown fields, there was some rust; but the average in the region west of Genesee river was thought by some equal to that of the best years—equal to that of 1833. In the centre of the State, and near Onondaga county, the wheat is said, in July, to be

somewhat injured by the grain worm; but the damage was comparatively trifling. In Schoharie county, in the same month, we find complaints of the weevil, by which many fields, it is said, have been destroyed.

In Schenectady county, large quantities are said to have been sown; but the ravages of the fly were so great that scarcely any, it was thought, would be saved; in many fields, the crop was entirely destroyed. The same remark is made respecting this crop, likewise, in Albany county, (where this insect was very destructive,) and also in Columbia, Dutchess, and Ulster counties. In some parts of Columbia county mention is likewise made of the rust; and it is stated that the fields generally appeared poor, much winter-killed, and that it suffered from rust and the maggot.

In the latter part of June, a good judge says that much of the crop in Dutchess county is cut off and destroyed. A little yellow worm in the head of the grain, and not the fly, destroyed it; but a new one deposites its egg in the young formation of the head and wheat kernel, producing worms, which devour the whole.

In parts, likewise, of Orange county, it is stated, under date of about the middle of July, that the wheat fields were attacked by a small worm (the weevil) previous to their ripening. In some places it is mentioned that the fly which committed its ravages appeared to prevail "on the skirts more than in the middle of the field."

An agricultural notice, in a paper published in New York city for July, says that "the early spring was favorable, and, as the harvest approached, the plants looked well; the harvest being in fine weather, the prospect was, there would be an average crop, and secured in a good condition."

In an agricutural journal, under date of July 15, from Queens county, Long Island, it is remarked, "the fly made bad ravages with our wheat; all was injured; and many farmers have not more than half a crop."

In other later accounts we are furnished with the following estimates: In the western sections of the State, especially in Genesee and Wyoming counties, the wheat crop is estimated by a good judge and a resident there to have been at an increase of about 25 per cent. over that of 1843. In Niagara county the account is: "The wheat crop of 1844 was uncommonly large; more so than ever before in this county. The estimated amount raised in this county, this year, by those best qualified to judge, is 700,000 bushels. The causes of this increased amount are several: 1st. Better cultivation and a better preparation of the ground by tillage. 2d. More care in selecting and preparing, and more effort in obtaining the best varieties of seed. 3d. A more general use of clover and plaster, as the best application of manure to the crops. 4th. A very favorable season. The increase of the crop over that of 1843 is probably from 25 to 30 per cent.

In Cattaraugus county wheat is thought to have been a fair medium crop; not so good as in 1843, but more was sown than usual, so that the aggregate is larger than in 1843."

A public journal for September, under date of Buffalo, has the following statement, which may seem somewhat at variance with the above-mentioned: "There is no doubt as to the crop of wheat being poorer than was anticipated in July and August. The yield has been abundant, while the sample is generally more or less shrimped, requiring a greater quantity to make a bushel of flour than usual."

In Allegany and Steuben counties, it is thought to have been equal or

somewhat above that of the previous year, "as there was a full crop." In Yates county and vicinity, a person well qualified to form a proper estimate says: "There is an increase in the wheat crop over that of 1843 of at least 38 per cent.; and he assigns as the cause, "a very favorable time for seeding and a growing fall." "The wheat," he says, "grew large before winter set in." In Wayne and Seneca counties "the wheat crop was estimated by some of the best farmers at 10 or 15 per cent. more than a medium crop." The estimates for the central part of the State are, for Tompkins and Chemung counties, that there was "quite an average crop. The breadth of the land sown was not so great, though the quantity was above the general average, but not equal to that of 1843." In Cayuga and Cortlandt counties, the crop is thought to have been "good, more than an average, 25 per cent. increase" in quantity; and in Onondaga county, "good, equal to the crop of 1843," and "of a very good quality." In Madison and Oswego counties, the crop is estimated at "15 per cent. better than in 1843. Further north—in Jefferson, Lewis, and St. Lawrence counties—the estimates of this crop are an increase of 15 per cent. on that of 1843," "a fair average," &c. The Central New York Farmer, published at Rome, in Oneida county, in August, says: "From the success attending the wheat crop in this vicinity, for the last two or three years, our farmers were encouraged to extend the cultivation, and considerable wheat was sown last year; and, from the apparance of the fields in the early part of the season, we had every reason to expect full an average crop; but the depredations of the grain worm have blasted our hopes, as from many fields it is conjectured that little more than the amount of seed sown will be obtained. The worm has been more prevalent this year than for several years back." Some pieces are badly struck with rust, owing to the late warm rains.

Along the Mohawk valley, in the counties of Herkimer and Montgomery, the wheat crop is estimated to have been "25 per cent. less than that of the previous year, owing to the rust and insect."

In Otsego county it is thought to have been somewhat better than in 1843; while in Schoharie county there was "a small crop," because the weevil proved so destructive. In Rensselaer county, but little comparatively is raised.

In the river counties the crop was less than in 1843. One well qualified to judge remarks, of Orange county: "The lands here are not well adapted to the growth of this grain; there is probably seldom if ever more grown than is consumed by us. This year, however, the crop is uncommonly poor; the severity of the last winter seriously injured many fields. Some fields, which early in the season gave promise of a favorable crop, were ruined by the rust, and the weevil completed our disappointment by devouring nearly or quite one-third of the gross product. By improved culture, our lands give a much larger product per acre than was formerly obtained from them; and fields which were uninjured have this year produced as well as at any former period. The best acre offered to the agricultural society for premium this year yielded *thirty-two* bushels, and the second best thirty-one bushels and twenty-four quarts." In Dutchess and Putnam counties, it is estimated that there is not more than half a crop, compared with that of 1843.

Westchester county is thought to have produced "more than an average crop;" and in Suffolk county, on Long Island, there was, it is said,

"an average crop," though "in some fields the stalks were thinned out by the severity of the winter."

From the above notices we think the conclusion is warranted, that there was in the State of New York an increased crop of at least 20 per cent. over that of 1843, which it will be recollected was 10 per cent. better than the crop of 1842.

The grain, it is probable, would not compare in plumpness with that of the previous year; but the progress of improvement and the increased amount of land sown justify us in fixing the increase of wheat as we have done.

The earlier notices of the appearance of the wheat crop in Pennsylvania, which we have been able to collect, are not so extended or varied as in the case of Ohio and New York. We will mention a few of the most prominent. In May, speaking of the promise of this crop in Chester county, it is said that there "is a prospect of a heavy crop of wheat." In another account it is stated that, in east Pennsylvania, there was "considerable injury done by the fly."

About the middle of June the crop of wheat in Berks county is described as being a "fair one," "but not so abundant as was before expected." In Bucks county, under the same date, the fields are said to have been full of promise; but the fly appeared, and became "most destructive." One person says, that, where he expected "to gather 1,200 to 1,300 bushels," he "could not now hope for 300." In the vicinity of Sunbury the wheat is said to be fine. The fly is not unfrequently mentioned during the month of June, but it appears to have been confined in its injurious ravages to particular sections; and it was thought that there would be "a full average crop" in Pennsylvania, "and perhaps more."

Later, in the last week of July, the crop in the southwestern part of the State, in the vicinity of Union, is described as "not equal to the expectations of farmers; there was much straw, but the grain proved to be small, and it was a good deal struck by rust."

The wheat crop of Beaver county is stated, in a public paper, early in July, to be "of a most promising aspect." In Germantown a new enemy is noticed—"a small, dark, ugly worm, three-fourths of an inch long, which crawls up the stalk, and devours the leaves." Later still, in Adams and York counties, "the crop," it is stated, "is an average one," and was "well secured," though in some parts of this State it is "badly shrunk."

From other sources of information, also, we learn that the results of the harvest varied in different sections of the State. Thus, the crop in Erie and some of the northern counties is thought to have been 25 per cent. better than that of 1843, as it was a fine growth, and was well gathered. In Beaver and Washington counties, in the western section, towards the south, we are told that "the crop is less than an average one, as it was much destroyed by the fly." A similar estimate is given with respect to the counties of Union, Greene, and Fayette, in the southwest corner of the State. "Many fields were not harvested, being too light and shrivelled to be worth cutting; but few fields of merchantable wheat—*i. e.*, which will weigh 60 pounds per bushel; some 50, 54, 58," &c. Some specimens of the Mediterranean wheat are mentioned as the best in that vicinity, "which weigh 65 pounds to the bushel." In Armstrong county, as appears from the reports of the commissioners of that county, the assessment list shows 192,000 bushels, and the crop is supposed to have been lessened 10 per cent. on account of rust.

As we advance from these counties towards the centre of the State, there is great complaint of rust; and the injury is said to be so severe that in some fields not more than three bushels to an acre has been harvested. In some central counties, also, the mildew and rust lessened the crop at least one-half.

In the central part of the State, in the counties bordering on the upper branches of the Susquehannah, the crop is estimated to have been one-third less than that of the year 1843, owing to the rust. It is stated, that a few weeks before harvest "the wheat crop promised to be very abundant; but about that time it was struck with the rust, particularly the wheat on the river bottoms and in the valleys, which injured it at least 50 per cent."

The same complaint of rust meets us as we pass to the eastern section towards the northeast, where the winter wheat is said to have been somewhat injured by the rust, "but to have yielded an average crop."

Towards the southeast, on the Susquehanna, and in the vicinity of Harrisburg, the rust is also said to have much damaged the crop, so that it yielded not more than two-thirds as much as in 1843.

Still further on towards Philadelphia, we are told that in the rich county of Lancaster the crop was "an average one, both in quantity and quality." In Chester county, "the early sown was good, the late sown suffered by rust." In the vicinity of Philadelphia, the crop, on the whole, was "pretty good." From the best calculations we can make, we think that the crop in general fell off from 10 to 15 per cent. in Pennsylvania.

In tracing out the progress of the wheat crop of Virginia, the next in order, a similar diversity in the various sections meets us. The earlier accounts of its appearance, so far as they have fallen under our notice, are quite promising. Thus we find it said of the crop in the vicinity of Wheeling, in the latter part of May: "Crops never looked better, or promised a more abundant harvest."

In counties bordering on the Potomac, also under the same date, the wheat crop is said to be "promising." In the vicinity of Winchester, early in June, the crops are described as "turning out well, though there may be, in some cases, partial failures." And, again, the remark is made of the wheat-growing counties generally, that there is the "prospect of an abundant crop," "a fine season for harvesting," and the crop itself "unusually healthy and advanced." There is some complaint of the fly; but the injury both in eastern and western Virginia is considered only partial—confined to some sections. In the vicinity of Staunton the crop is stated to be "good," and but little complaint is made of any injury there sustained. Under date of Wellsburg, July 3, a writer also says, that "the crops in the upper part of the county are promising."

There are some exceptions; for one account from Frederick county speaks of the wheat being "much shrunk, because of an excess of wet weather;" and an article in the Wheeling Gazette thus mentions the state of the wheat crop in that neighborhood: "The wheat fields in this vicinity, in harvest, presented a most promising appearance; and it was supposed at that time that we would have a harvest rich and abundant beyond all former precedent. As soon, however, as the farmers commenced threshing out their grain, the discovery was made, that the flattering indications of an abundant yield above referred to were deceptive; there was, to be sure, an unusual amount of straw, but the yield of grain fell far short of the reasonable expectations of our worthy agriculturists. And it was

also discovered that a great deal of the wheat was light and shrivelled, some of it requiring five pecks, in measure, to make a bushel of the standard weight. We also regret to learn that many fields were injured by the rust. Notwithstanding all these drawbacks, we are inclined to believe that the aggregate amount of wheat obtained this season in the agricultural region of the country adjacent to our city will fall but little, if any, short of the average yield of former seasons; for we are assured that much more wheat was sown last fall and spring than usual; and many of our farmers have, undoubtedly, harvested unusually fine crops."

Referring to later accounts, also from various sections, since the harvest, we gather the following particulars, which, in some parts, are less promising:

"On the southeast, embracing several counties, including the Isle of Wight, Sussex, Norfolk, &c., there has been, it is thought, an increase of 20 per cent. over the previous year.

"This is owing to the favorable effects resulting from the use of marl in that region—more attention having been directed to this object than before."

From this point, towards the centre, it is judged that there has been "an increase of 25 per cent., owing, among other reasons, principally to the growing of a more forward kind of wheat and a more favorable spring." On the east, from the centre of the State, in several counties bordering the Potomac and its vicinity, there seems to have been "scarcely an average crop;" while on the southern central section of the State, bordering on North Carolina, the wheat crop is represented as having "fallen off at least 50 per cent., on account of rust, caused by its coming up badly and a moist warm June." North of this last section, however, the injury seems not to have been much felt, as the crop is pronounced to have been, "both in quantity and quality, an average one." Further west, in the counties on the Kanawha river, it was likewise "an average crop."

Taking all the information within our reach into the account, we seem to be authorized to estimate the crop in Virginia in 1844 to be an increase of about 20 per cent. over that of 1843.

The notices respecting the wheat crop in Indiana, in May and June, are of various kinds. Complaints, even at that early date, are made of the fly; but the principal injury seems to have been occasioned by the severe rains, which deluged portions of the wheat-growing sections of the State. Thus we find accounts like the following:

A person, near Goshen, Indiana, writes: "I am almost discouraged; the weather is very unfavorable for farming; very wet and rainy. The fly is taking the wheat here at a dreadful rate, destroying some pieces entirely. The crop here presents a most unfavorable appearance. Some fields have been ploughed up, and corn planted therein."

Again: speaking of the prospect of the crop in the valley of the Wabash, especially the bottom lands, it is said: "There is every appearance of a bad crop." Other accounts, however, at this period, are more favorable. Thus the Indiana (Rising Sun) Blade, of the 18th of May, says: "The prospect of this portion of the country for abundant crops is favorable. The wheat is unusually forward, and we are informed by farmers that, from present indications, it will be ready to harvest by the middle of June, some two or three weeks earlier than usual."

And again: the Madison (Indiana) Banner, of June 5th, after noting

the bad condition of crops on the Wabash bottom lands, says: "In Jefferson and Jennings, and all this region of the State, the wheat crop is more promising than it has been at the same time in any former year within the memory of man."

From another statement we gather the following:

Michigan City, (*Indiana*,) *June* 4.—"Wheat still commands 65 cents; but small quantities coming in. It is now considered that the frost we had about the 20th May did but little injury to the wheat; the fly has injured some fields, but the prospect now is of a fair crop."

In July the remark is made, that "the wheat crop, in various sections, has suffered from the fly." A similar diversity also exists in the later reports. In the central counties of the State, the accounts are favorable, and "a large crop is spoken of." In the counties lying in a southeasterly direction from the centre, and reaching on to the Wabash, the crop is estimated to have "fallen short 33 per cent., on account of the rust." North of these, however, another statement gives the opinion that the crop is greater than an average one, and exceeds that of 1843 by 25 per cent. As we proceed still north, on the upper waters of the Wabash, "the rains proved so severe," as has been mentioned, that the crop is reckoned at "not more than half of that of 1843." In the southeast, inclining to the central south, bordering on the Ohio river, including the counties of Washington, Scott, Jefferson, and some of the neighboring ones, there is more than usual complaint of rust; and the crop has been estimated at "not half a crop, and less than that of 1843." Northeasterly from these counties, and bordering on Kentucky and Ohio, in Dearborn, Ripley, Switzerland, and Franklin counties, and some others, there was likewise "a small crop;" and the same cause, the "rust," is assigned as the reason. Still further north, and bordering on Ohio, and back towards the centre, the crop is estimated at "30 per cent in advance of that of 1843."

It must be taken into view, however, that a large quantity of seed was sown on a greater breadth of land than had been done the previous year; and, when we consider this fact, it seems probable that, if we estimate the whole crop at about 20 or 25 per cent. less than in 1843, we shall not vary greatly from the true state of the case. We are inclined to think that the difference, either side, cannot be more than 5 per cent.

Respecting the wheat crop of Illinois, our earlier notices are somewhat more full; and these, as well as the later ones, lead us to the conclusion that this crop, though promising at first, suffered even more than in Indiana. Thus, in May, we are informed that "the fly is doing great injury in many parts of the State." And, early in the month, the Chicago Journal says: "The Hessian fly has made its appearance on Hickory creek, in Will county. Several entire fields of wheat, both winter and spring, have been destroyed. The loss, however, occasioned by this insect is confined, thus far, to small sections of country. The wheat crop, as a general thing never appeared more promising in northern Illinois than at present."

Again, speaking of this and other States, the Prairie Farmer, published at Chicago, says: "If there be not a larger wheat crop in the United States this season, or in the West at any rate, than ever before, we shall be disappointed. In our rambles through Illinois, we have seen and been informed that more wheat was sown last fall than usual; that, almost without exception, as far as we have been able to learn, it has been uninjured by the weather. The early opening of the spring will hasten its growth, so that

there will be little danger from rust; and this being the chief cause of fear for wheat in this region, we think the prospect is good for a large crop."

At a short period after, however, we find the accounts more discouraging, and early in June the prospects of the wheat crop in Illinois are mentioned as "unfavorable." In a St. Louis paper of June 1st, the fly is said to be "doing great injury" near Fox river, in Illinois.

Again, we have the following notice:

"*Little Fort, (Illinois,) June* 5.—After a rain of nearly six weeks, we have got a glimpse of the sun, and things begin to move. The season has been very unpropitious for putting in the spring crops, and, in this section of country, there will not be so much spring wheat raised as in the preceding year. There is, however, an abundance of wheat in the country; but the roads are so bad that very little gets to market. We are paying now 62 to 65 cents for winter, and 50 to 55 cents for spring. The crops in the ground look well, and every thing promises well."

Again, the Quincy (Illinois) Whig of the 3d instant says: "The rains of last week, it is feared, will have a serious effect upon the crops. Many of the farmers had commenced cutting their wheat, but were obliged to suspend their operations in consequence of the wet weather. Although the prospect, some weeks since, was very fair for a large yield, the continued wet weather has operated most disastrously, in many instances, upon the prospects of the farmers. Whole fields, we are informed, in this and adjoining counties, will yield little or nothing. The prospect for corn is even worse than for wheat, and, unless more favorable weather intervene soon, there is every probability of a failure in the crop."

Under date of June 3d, in Warren county, an informant writes us: "The season in this section is rather unfavorable. The wheat crop, I think, will be short of the expectations of all; the growth is most rapid—it is already beginning to head; but, whether from early frosts last fall, or the immoderate and cold rains this spring, I cannot say. On inspection by myself and some of my neighbors, it appears to be about one-third or one half less; our wells, ranging from 14 to 20 feet deep, are full to the top; the ground appears to be so much saturated with water, one would think it would never dry; the rains have been so numerous, that, before the ground was sufficiently dry to plough, another rain would follow."

The Prairie Farmer of July says that "the wheat crop is in some places luxuriant, but has suffered severely in various sections by the fly." And the same agricultural journal, of September, speaks of it having "promised well," but that "it did not yield half a crop in middle Illinois;" and that "much of it was not cut, on account of the wet and rust."

In Warren county, it is stated that the crop "fell far short of last spring's promise. The rains were so incessant and immoderate since last March, that much fall wheat has been more or less injured by rust or scab." Spring wheat, likewise, is said to be injured. Much of the wheat brought to market is stated to be "of a poor quality;" and the same complaint is heard of injury by long-continued wet.

The following estimates have been received since the harvest has been gathered:

In southern Illinois, one person considers the crop "as good as that of 1843." In the southwest tier of counties lying along on the Mississippi, on the other hand, it is stated that it did not reach to more than two-thirds of the crop of the previous year; and the "wet weather, and rust before

the harvest," are assigned as the cause of this decline. North of this, reaching up to the centre, as compared with the crop of 1843, that of 1844 is placed as high as "100 per cent. increase," as "the crop of 1843 was very small, and that of 1844 was a remarkably good one." In the southeast counties, on the Wabash, and running back towards the centre, the crop is pronounced to have been "a very indifferent one," having "suffered much from long-continued rains;" while in the central counties, and on towards the north, we are informed that "the wheat crop bade fair in the spring to be an uncommon yield; but, owing to the unusual floods of June, it ran too much to straw, and rust injured the crop. Some fields were entirely destroyed, and most of them injured in quality." Owing, however, to the large quantity sown, the crop may have turned out "an average one." In the northern part of Illinois, it is thought by one to be "a good crop," and towards the south "more injured by rust." A good judge, speaking of the wheat crop in this State, says: "The wheat crop in the vicinity of Chicago was a fair crop, though in quality it was poor, shrunk, and with a larger than usual growth of straw. It promised finely in the early season, but ran too much to straw." It was also injured in some of the counties of northern Illinois by rust and the fly, and was about the same as in 1843. From these various accounts of the crop in different parts of the State, we are inclined to believe that a decrease of 25 to 30 per cent. should be allowed for the whole crop.

The wheat crop of Michigan has gained largely for two or three years past. This is one of those States where, owing to new lands being brought under cultivation, and a large increase of population by immigration, a greater extent of field is sown from year to year. Had there been nothing to injure the crop, the increase on that of 1843 would have been a large one. The earlier notices of the wheat crop in Michigan were somewhat unfavorable. A specimen of this appears in the following:

"*St. Joseph's*, (*Michigan*,) *May* 31.—Last week we mentioned the fact, that the fly was making sad havoc with the wheat crop in this vicinity. Since then, we have noticed that this enemy of the farmer infests different parts of this and the adjoining States. Still, the ravages of the fly appear not to be suficiently extensive to affect materially the general crop."

In June we find this account of the prospect, and the causes at work to influence the decrease of the crop: "While at the east and south the weather during the whole spring has been unusually warm and pleasant, and vegetation far in advance of the season, with us, throughout the whole west, we believe, there has been almost continuous rain. Our streets seldom present a worse surface in the early spring, and the roads in the interior, we are told, are in many places almost impassable.

"The effect of the heavy rain upon the wheat and spring crops has been exceedingly unfavorable; but whether so much so as to injure materially the harvest, cannot yet, we imagine, be determined. We hear, too, that the Hessian fly is doing much injury in some quarters. We fear, therefore, that the wheat crop, especially, is less promising in this State than it has been for several preceding years."—*Detroit* (*Michigan*) *Advertiser of June 7th.*

As an exception to this, it is said: "We are gratified to learn from the Oakland Gazette that the wheat crop looks well in that county, especially in the northern part."

In July, the accounts are not more favorable. Thus, from Centreville, we are informed, "the harvest is just beginning; but our crop of wheat will be far below medium. The fly in early spring, subsequent and long rains, and now within a few days the rust, have destroyed much wheat." Again:

"*Ann Arbor, July* 24.—Farmers are now in the middle of their harvest. The crop appears to be an average one. The straw is much rusted, but the grain appears to be but little shrunk."

In Monroe county, likewise, in July, the wheat crop is mentioned as being "nearly ruined by the fly." In other sections, it is said that "the wheat is coming forward finely, and bids fair to be an average crop. The ravages of the fly have been confined to small districts, and on light sandy soils." In Pontiac, also, it is stated to be "an average crop." The Michigan Farmer of July also mentions that the crop was suffering severely in various parts by the fly, and says, by way of curing the evil, that "where the fly has appeared no wheat there grown should be used for seed, and when practicable old last year's wheat should be sown." The eye bright is also mentioned as likely hereafter to prove an enemy to the wheat crop, as it is increasing in some sections. Again: "Although the fly and worm have spread devastation and ruin over many wheat fields throughout the entire valley of St. Joseph, yet the prospect is that we shall have a larger quantity for exportation the coming year than ever. This will arise from the fact that there was a larger quantity sown last fall than in any previous year."

In the next month, (August,) the following are some of the accounts which have been gathered respecting the wheat crop in Michigan: The Michigan State Journal (Ann Arbor) says: "The aggregate crop of the country will be less than was expected. In many places, the grain is very much shrunk." Again:

"*Jackson, August* 15.—The wheat crop is almost an entire failure. The insects took it last fall, and the rust in the spring, and then again the insects a second time."

In Calhoun county, the crop is said to be "light;" and the suggestion is made that the Michigan subsoil plough may be very useful; "but there is nothing like an average crop." Under date of Grass Lake, at the same period, a writer remarks, that the crop there is "almost an entire failure. Some fields were not harvested." The following causes of this poor crop are assigned:

"1. The land has been run to wheat from year to year, without manuring or seeding it down.

"2. The sowing of the same seed year after year on the same farm.

"3. Sowing too early or too late.

"4. The practical culture of many acres, rather than the thorough tillage of a few."

Later information corresponds well with the above. Thus, in the south-eastern counties, we are told that there is "not more than one-fourth of the surplus of 1843, owing to the wet season and the ravages of the fly;" and that in some cases "the injury was so severe that the farmers had to plough up their fields, and sow them over again."

In the northern and eastern section the grain is said to be "much shrunken, from rust;" and in the south part of this section it was "injured by the

fly;" so that, on the whole, the crop in this region "fell short of 1843 at least 25 per cent."

In the western section of the State the wheat crop was likewise much injured by the rust. "The early sown" is said to have been a "good crop;" but "the late sown" was "nearly all ruined; not more than half a crop was obtained, and this probably did not yield more than half the usual quantity of flour."

From all these accounts, it is evident that, but for the increased quantity sown, a very large deduction must be made from the wheat crop of Michigan for 1844, compared with that of 1843; but, regarding this counterbalancing consideration, we may fix it at from 20 to 25 per cent. less.

So far as we can form any estimate respecting the wheat crops of Tennessee and Kentucky, where considerable wheat is raised, it is thought, that while there have been much blight and rust in the latter of these two States, so that in some parts it amounted to almost a total failure, and a falling off of 15 per cent., on the other hand, the same crop has given a more favorable result in Tennessee; and by some the estimate is of an advance of 25 per cent. on the preceding year.

In the northwest section of the State, the estimate is, that there was not more than half a crop; not so much was sown, and the wet weather, with the rust and smut, injured it. In the Tennessee valley, bordering on Alabama, it is mentioned, in an agricultural journal, that the "wheat was cut from the 15th to the 20th of May—a light yield, and does not make good flour."

For the whole State, we are inclined to fix it at from 10 to 15 per cent. increase, and for Kentucky a decrease of about 15 to 20 per cent.

As we have been disappointed in obtaining as full information as was desired on these two States, we do not speak with equal assurance as with respect to other portions of our country.

In the State of Maryland, lying as it does contiguous to the States of Pennsylvania and Virginia, the crops will be likely to be affected by the same causes which operate in influencing the crops of those States. The harvest being as early, the grain crops must naturally have shared likewise in the advantage of the same warm and dry weather, which has been favorable to the wheat crop, already described.

On referring to the earlier notices of this crop, we find, under date of June, at Hagerstown, that the prospect in the valley of Washington county promises well, though the fly appeared in some few fields. In Kent county, in June, it was thought that the crop would be a "moderate" one. In Kent and Montgomery and Queen Anne counties, a month later, it is pronounced to be remarkably fine and heavy. The Frederick Herald of July says, of the wheat crop: "We hear less complaint than usual; and although the rust and smut have done some little injury, we have but little doubt that the main objection to the wheat will be, that the grains are not sufficiently weighty, and are shrivelled, from the excess of wet weather lately."

Again: the American Farmer, during the same month, states, that notwithstanding there have been partial failures in some portions of the wheat-growing regions, we believe that in the aggregate the crop has proved an abundant one.

In August, in Baltimore and some of the adjoining counties, it is stated that there was an average crop, and well secured; and the general report

of the journals seems to be, that there was a full crop; that, though there was some rust and fly, yet these causes produced less damage than usual. The harvest was earlier also, commencing by the 1st of June.

Similar favorable reports are made from other sources. By one person the crop along the vicinity of the central counties is pronounced to be at least 12 per cent. better than in 1843, owing to the mild winter. Another estimates the product of the northeastern section of the State to be "a fair crop;" while, by yet another person, the crop for 1844 is thought to have been, compared with that mentioned in the last census on the crop of 1839, full 40 per cent. increase. This increase is considered attributable almost entirely to the improved system of farming, and the more general use of plaster, lime, and clover; so that fields which, a few years since, were too steril for profitable cultivation, are now some of the most productive parts of the district. This refers particularly to the counties of Baltimore, Carroll, and their vicinity. On the whole, therefore, the wheat crop of Maryland was probably at least 20 per cent. above that of 1843.

The wheat crop of North Carolina is described in the spring as being promising. Under date of May 25, at Red House, the wheat crop is stated to have never been more promising; the spring the earliest ever known there; so that even then they were preparing to cut their wheat. Subsequent accounts inform us that in these southwestern counties it is over an average, having had a good season in which to mature, the weather being dry and pleasant. On the northwest, also, the crop is supposed to have been about an average one. On the northeast, also, it is stated to have been good; while on the south, bordering on South Carolina, in the centre, owing to the injury received from the drought, the crop fell perhaps one-third.

Taking every thing into view, we feel authorized to place it for the State at an increase of 10 per cent. over that of 1843.

Our information from New Jersey is scanty as to the appearance of the wheat crop. We find some complaints of injury by the winter season, and also from rust and smut; and by some the crop is thought not to be more than half the average one, especially in the northern central part of the State.

In the southeastern section, towards the ocean, it is stated to have been "a good crop;" while again in the northwestern it is estimated at 10 per cent. less than in 1843. On the general crop, we think that a deduction of about 10 per cent. must be made throughout the State.

The wheat crop of the New England States in general, for 1844, was better than the crop of the previous year. The weather was more favorable for its growth, and also for the harvest; so that it was secured in better order, and less injured by the fly and rust, or other evils, than usual. On this account, there was a general increase, on an average, of at least 20 to 25 per cent. throughout these States. Still, the amount raised in the whole is but inconsiderable, compared with that of many States.

In Maine, so early as July, the wheat is mentioned in the agricultural journals as being in prospect uncommonly good; and the same information is given in August, about one month later. The wheat crop is stated to be of better quality than for many years; not so much injured by the weevil, except in Somerset and some of the upper counties; the cool nights have prevented the rust, as the summer was comparatively cool. The other accounts of the crop are equally favorable.

By one, a good judge in these matters, we are told that the wheat crop is "more productive than any since that of 1837;" and the reasons assigned are—"1st, decrease of the weevil, which, for six or seven years, has been the scourge of the farmers raising this grain; 2d, cool season while it was in growth and maturing; some fields, indeed, suffered by a worm at the root, but, on the whole, the crop was good." Again, respecting the crop in some of the northern central counties, it is stated to be "about the same in quantity as in 1840, perhaps 10 per cent. more; it was somewhat injured by the weevil, or it would have been 20 per cent. more."

We think, from all the information we can gather respecting the progress of the crop in this State, that there has been an advance on the year previous, especially considering that there was then so great a falling off as 15 to 20 per cent., perhaps more.

In some parts of New Hampshire the grain crops especially were injured by the drought, so that it has been estimated in the southeast section of the State as being one-half less than the crop of 1843. In the central western, bordering on the Connecticut, this crop is spoken of as being much above the average one. Lower down, towards the southern boundary of the State, our informant places its amount at "about the same as the previous year." Probably, if we allow an average increase of 10 per cent. for the whole State, we shall be near the truth.

From an agricultural journal, we learn that some sections of Vermont, bordering on New York, suffered from the fly called the midge; yet this crop of wheat was thought to be the largest in 1844 which had been gathered for many years. In Franklin county, for instance, it was estimated at an increased value of $10,000 beyond the ordinary one; and the opinion is expressed, that there would be raised in that State almost enough for home consumption there. The average yield is considered by one person, in a letter to an agricultural journal, to reach to probably twenty-five bushels to an acre, while last year it would not amount to more than from 18 to 20.

An instance is mentioned of 42½ bushels having been raised to the acre, which is certainly a large yield. The variety called the Black sea is a favorite one, as it appears to be well adapted to the climate and soil, and most productive. Similar to this is the information we gain from other sources; and the gain on the preceding year is estimated variously, from "20 per cent. up to 50 per cent." There is no complaint of rust, and little or no damage was suffered from the weevil. The advance for the whole State, we think, will not be too highly estimated if we fix it at 25 per cent.

Wheat is considered a small crop, comparatively, in Massachusetts, Rhode Island, and Connecticut, so that we are able to gather but little reliable information respecting it in these States. Some variation is observed. In some parts it is estimated at a loss of 5 per cent.; in others, it is said to have been a full average for the quantity sown, and the quality very good. It is supposed that the general average increase may be about 10 or 15 per cent.

There seems, on the whole, to be an evident falling off of this grain crop in Georgia. The estimates which are given from various parts are: "Rather short, owing to the drought in the spring." "Moderate, though rather short." "Short of 1843, owing to the drought of the spring." "Twenty-five per cent. short of last year, in consequence of the cold and wet weather in January and February last, and drought in March, April, and July." Cass and Gwinnett present, however, an exception, as we find the estimate of

the former to be placed by an intelligent farmer as high as 75 per cent. increase on the crop of 1843, on account of the low price of pork and the almost no price to be obtained for corn.

A good judge thinks that the product of the wheat crop for 1844, in Gwinnett, must have been about 60,000 bushels, which was probably an increase of 20 or 30 per cent. over that of 1843. This favorable result is said to be owing mainly to the fact that the spring of the last year was dry—a state of things which it is observed in that region always is favorable to wheat. On the whole, then, we believe that, from the best intelligence we can obtain, the wheat crop for 1844 in Georgia must be set down as 20 or 25 per cent. less than that of the previous year.

As to Iowa and Wisconsin, adjoining Territories, to judge from the accounts of the progress of the wheat crop, though there is considerable diversity of opinion, it was a very fair one. Thus, in July, we find the following notices. A correspondent of a public journal, under date of July 5, at Bloomington, says that "the fall wheat is good, but that it is expected that the rust will injure the spring wheat."

We have just received a letter from one of the largest wheat growers in Iowa, dated July 28, which states that "the crop of wheat in that Territory has been well secured, and the yield is full an average crop. The number of immigrants is very large, and all the breadstuffs will be needed for home consumption."

Milwaukie, July 25.—"The harvest has commenced in our vicinity, and the prospect is of a good crop, and the weather is very favorable for ingathering."

Southport.—"The harvest has just commenced, with most encouraging prospects to the farmer. Some fields on the prairies have been slightly touched with rust, but those in the "openings" have not, and none will be greatly injured. Some beautiful samples of new wheat have been brought into market already. That brought in by Captain Rand, of Pleasant Prairie, is as fine as we ever saw. Wheat commands 60 cents this week from our buyers."

The Davenport Gazette of August 1st says "that the wheat crop in that country, under ordinary circumstances, would have been unprecedented; but the late heavy rains have caused rust to injure it, so that it cannot be called more than an average yield. Those who cut their wheat early rescued it from rust, but much of that left until fully ripe was scarcely worth the cutting."

Green Bay, July 16.—"The crops in northern Wisconsin (wheat and corn particularly) never looked better than at the present time."

Some later accounts, however, speak of the wheat crop of Iowa as poorer than last year. In the northern section of the Territory, it is considered to have been very good; but in the southern it is said to freeze out more, and not to be equally large in proportion to the quantity sown. On the whole, as the cultivated tracts seem to be continually more extending, the crop in these Territories may be set down at an advance of 15 or 20 per cent.

Though but a moderate product in comparison with other more favorite crops, yet the wheat crop for South Carolina, for 1844, (differently estimated as a "fair crop," "average crop," "one-quarter more," "wheat crop produced abundantly,") probably was a general increase on the preceding year of about 20 per cent.

Alabama, likewise, owing to the great attention paid to the cotton crop, raises but little wheat. The crop of 1844, on the whole, seems to have been a "pretty good" one, and may probably be set down as an advance of 10 per cent. above that of 1843.

In Missouri, the earlier report in some places was favorable. In Madison, Washington, and Jefferson counties, it was thought that there would be an average yield of wheat; but the heavy rains destroyed a large proportion of the wheat crop, so that it is thought that there was not more than half an average crop; and we feel justified in placing it at 40 per cent. less than the crop of the previous year, believing that, taking the various elements which help to form our conclusion into view, we shall not err greatly in such a deduction.

Besides the particular notices which have been given of the wheat crop under the different States, we find the following general estimates respecting the wheat crop of the whole country, which it may be well to quote, as showing the views of those who have paid considerable attention to the subject. The Cultivator thus sums up the product of wheat for the year 1844, in a late number, (December:)

"This great staple product has yielded variously in different sections of the country; but in a territory embracing so many degrees of latitude, and possessing so varied a climate, it can hardly be expected that the same crop will succeed equally well in all parts the same season. In Maine, New Hampshire, and Vermont, the spring wheat is generally cultivated, as it is considered better adapted to the climate than the winter wheat. The worm in the head, (*cecidomyia tritici*,) improperly called weevil, has prevailed there to such an extent for several years, that this crop has been considered quite uncertain. The insect has, however, been less destructive during the two last years, and, from all the accounts we have seen, the yield of wheat in that section has been generally good the past season. In the eastern part of this State, (New York,) the insect above mentioned injured the winter wheat to some extent; but in the Genesee valley, and the great wheat districts of the State, the crop was good. In northern Indiana, northern Illinois, Michigan, and Wisconsin, the fly (*cecidomyia destructor*) did much injury to the crop, in many instances occasioning almost a total failure; and we are informed that this enemy has already made its appearance in great force in the early fall-sown wheat. In the southerly part of Ohio, Indiana, and Illinois, wheat, in many cases, did not fill well; the growth of straw was very great, but the prevalence of warm wet weather occasioned much of it to fall down or rust. This was quite generally the case on rich land. On the uplands, of not so rich a quality, the crop was better, and the grain plumper and heavier. Taking the Western States together, however, we think the wheat crop did not give an average yield per acre, though, from the large quantity of ground sown, the aggregate product was not probably less than in any previous year. So of the country at large, there was probably as much wheat produced the past season as in any former one."

The aggregate of the wheat crop, as appears by the tabular estimate, for the whole country, during the year 1844, was 95,607,000 bushels.

The ravages of the Hessian fly are becoming every year more alarming, and there is great danger, if more pains is not taken in time to counteract the evil, that the wheat crop in our country will be seriously lessened, if not destroyed, by the same. In the hope of aiding the wheat growers

against this destructive enemy, an able paper has been procured from Edward C. Herrick, Esq., librarian of Yale College, who has devoted much time to microscopic observation and collecting information respecting this insect and its habits, and whose well-known ability and accuracy of investigation entitles his valuable remarks to great weight. This interesting document, which Mr. Herrick has in the midst of his other avocations kindly furnished us, will be found in appendix No. 1.

He thinks, as will be seen by a reference to his views, that the only possible method of extirpation is in burning the stubble, and ploughing it. It is hoped that the farmers will endeavor to practise on the recommendation, so that there may hereafter be less injury sustained from the ravages of this insect.

Dr. Harris, in his treatise on insects, speaks of the wheat fly, which is very destructive of the wheat crop, and which is sometimes confounded with the Hessian fly. Some extracts from his volume may be found in appendix No. 2.

As a means of destroying slugs or worms which sometimes do great damage in England, salt is very highly recommended in the English Farmers' Magazine, in the volume of which for 1843 may be found an account of the experiments of a Mr. Buske, which were extended over some hundreds of acres.

He says: "In every situation, at every time, the effect appeared equally beneficial; the quantity used per acre was four or five bushels, sown out of a common seed shuttle in the evening. In the morning, each throw may be distinguished by the quantity of slime and number of dead slugs on the ground. In some fields, it has certainly been the means of preventing the destruction of the whole crop."

In an essay, by the late Willis Gaylord, on insects injurious to the farmer, published in the New York State Agricultural Transactions, he says: "Kiln drying the wheat effectually destroys the weevil;" and from some late experiments, recorded in the Tennessee Agriculturist, it appears, that if a hogshead, with one head taken out, is inverted over a fire, till thoroughly heated, and then is immediately filled with wheat, and headed up, all the weevils in the wheat will be killed, and the grain may be kept in safety until wanted for use. Keeping a granary well ventilated and cool, frequently stirring the grain, will do much towards preserving it from insects. A gentleman in Ohio gives the following account of a successful experiment against the weevil, in a letter to this office. He says: "I was, some twenty years ago, induced to make the experiments by the ravages of the weevil. They completely destroyed two crops of wheat. The third I was determined they should not entirely deprive me of. I let the grain stand in the field until *completely dry*, and then threshed and had it immediately ground, or before a *sweat* could take place. It made more and better flour than I had ever got before. I expected it would soon sour, but it continued perfectly sweet till the next harvest. I then laid a barrel by till the next harvest, and then opened it, and found it to be as sweet as when first ground. I have continued to act in the same manner for a number of years, and have never known it fail."

In the last agricultural report, some suggestions were made with reference to the disease called smut, in wheat and other grain. The importance of the subject justifies further remarks in this connexion. We notice that, in a recent lecture, Professor Johnston gives the following account of this

disease, which is a species of fungus, the sporules of which are so exceedingly minute that they are taken up and ascend through the pores and sap vessels of the plants.

Professor Johnston observed, it is said, "that the smut had received the name of *uredo segetum;* that these puff balls or sporules were so minute that it would take 2,800 of them to cover an inch. There was no doubt that they ascended through the plant. By examination, it could be seen where they had come up. The tubes of the stalk were filled with black matter that had come through the vessels, affecting first the straw, and then getting into the ear, where it spreads itself all over. After passing through the stalk, the smut fixed itself under the root of the flower, which it rendered barren; and as the grain approached perfection, the puff balls became tight, and burst, showing black dust of very minute particles, so minute that it took about 1,100,000 of them to lie across a single inch." He then went on to speak of the manner in which smut was propagated. It was in the first place sown along with seed. Very often it was so minute that thousands of the particles might attach to a single grain, and yet not be visible to the naked eye. Oats are more subject to smut than other grain. Rye is never attacked by it, and wheat seldom. Grasses are sometimes attacked by it, and much injured.

"Certain substances have been employed for the prevention of smut. The substances used are, sulphate of copper, or blue vitriol, wine, common salt, wood ashes, lime water, and sometimes arsenic. The application of these substances to the seed grain destroys the black dust, or the spores of the fungus; and, in addition to this, they make the grain grow better. Professor Johnston mentions an instance where a large field of oats was divided into several parts, and the seed doctored in different ways—some not being doctored at all, other portions being dressed with guano, and others steeped in the following composition: phosphate of soda, sulphate of magnesia, nitrate of potash, common salt, sal ammoniac, or sulphate of ammonia. One pound of each, in ten gallons of water, to steep 300 pounds of seed, the moist seed to be dried with gypsum or quicklime.

"On looking at that field, it was found that the grain to which nothing had been done was smutted; that which was dressed with guano was also smutted, as was likewise a portion where Campbell's steep had been used; but there were only two or three stalks affected with smut in the grain steeped in the composition above mentioned.

"The smut which is sometimes found in wheat, called *dust brand,* or *pepper brand,* is supposed by some to be a different species of *uredo* from that above spoken of. It is sometimes called *uredo fœtida.* But the same remedies against its attacks are used with equal effect."

In an agricultural paper, we find also the following statement as to an approved method of remedying this evil: "'A gentleman near Baltimore has for several years been in the habit of washing his seed wheat in a strong solution of glauber salts, (sulphate of soda,) with the view of preventing smut, with complete success. He says he makes the solution strong enough to bear an egg, fills a tub half full of it, and then pours in half a bushel of wheat at a time, stirs it round well with the hand, skims off all the floating grains and other foul matters, dips out the wheat with a colander, lets it drain, spreads it out on the barn floor till not quite dry, then rolls it in air-slaked lime, and sows it. One man can wash and prepare in this way as much as a dozen men can put in the ground. Every descrip-

tion of foul seed, garlic, and filth, (except cockle,) is effectually taken out of the wheat by this process. He has no smut in the wheat since he adopted this plan. Glauber salts can be purchased by the barrel at about one cent and a half a pound. The wheat swells while undergoing the process about 25 per cent.; that is, four bushels will become five. If, after washing, it be left upon the barn floor all night, and thus become dry, it will lose a large portion of its increased bulk. It is better, however, to put it in the ground while somewhat moist, as germination will take place sooner; and the quicker any seed germinates after being put in the ground, the better. Besides the great object in view, the getting rid of smut and other impurities, there can be no doubt that a most valuable nutritive and stimulating principle is added to the seed grain, in the soda that is absorbed. Farmers will do well to try the experiment. They may be assured it will do no harm, and it is not very costly. Probably a dollar's worth of the salts would be sufficient for fifty or a hundred bushels of seed."

A distinguished agriculturist recommends the following recipe, on the information of one who said he knew it to be infallible, after many experiments:

"Dissolve a pound of blue stone in as much water as will cover five bushels of wheat, and let it remain about eighteen hours before it is sown, and you will never have smut in your wheat."

We find, also, in one of the numbers of the Southern Cultivator, the recipe for the prevention of smut in wheat, which we give as we find it:

Mr. Editor: I discover that you have several correspondents, giving various means to prevent the smut in wheat; and, as this is an important matter, I will give you one.

My neighbor, Alexander R. Bell, of this county, has long been considered a great wheat grower, and a great many persons are in the habit of sending some distance to purchase his wheat, on account of its superior quality. About the time he was cleaning his crop, I happened in, and he took me to his barn, to show me his great yield. I was astonished to find that there was no smut in his wheat, and remarked it to him. He said, no; I never have smut in my wheat. I inquired the means of preventing it, and he gave me the following: Sow your wheat the first of October, and when you harvest let what you intend to make seed of remain five or six days longer in the field before it is cut, and by this means all the grains will be perfectly ripe and good. This is all he does to prevent the smut, and he never has it in his wheat.

I stated that I had been out to see his yield, which I found to be fine. He sowed one bushel and a peck of wheat, and it yielded him forty bushels and a fraction over; it was as nice and as fine wheat as I ever saw, and made good flour. Yours, respectfully, W.

Columbia County, Georgia.

An editor of an agricultural journal recently established in Cincinnati, Ohio, a good judge in these matters, says, that the failure of the wheat crop in Ohio is often falsely ascribed to rust, as he states that many fields said to be destroyed from rust, on examination, "were in reality very little affected by rust at all. The straw merely turned brown because it had not the materials to give it a better color; and the berry did not fill, simply because the plant could not obtain the proper elements for it to fill with."

To obviate the evil which arises from the mixture of cheat with wheat, the following is said, in an agricultural paper from which it is taken, to be a good method:

"Instead of having a riddle, as ordinarily used, in the fan, place a board in the riddle's place; it may be an inch or two narrower than the riddle in width. By this means, the cheat is carried nearly off the screen board; and, with the aid of a strong wind, is driven pretty effectually out at the second run of the grain.

"The present year I undertook to clean some Mediterranean wheat, which had a pretty large share of cheat in it. By the aid of the above plan, at the second run, it was pronounced by an old and experienced farmer to be clean enough. I believe I might have run it five or six times the ordinary way without having it as clean. Thus I saved much labor, as well as some time, though it must be let through slowly and regularly, to prevent the falling sheet of wheat from obstructing the passage of the cheat while blowing out and falling through the fan sieve. This I accomplished by resting the half bushel on my shoulder, and letting the grain fall gradually into the fan hopper, which was aided by the jar of the fan in motion. This last precaution may not be necessary where hoppers are new, and properly constructed; but ours was old, and worn loose at the connecting points."

In the report for 1843, some notice was taken of a few varieties of wheat, and their adaptedness to our country. We find in the last volume of the New York State Agricultural Society a valuable essay on this subject, by General Harmon, of that State, who has done much to improve the culture of this valuable grain; and though it has been more or less published in the various agricultural journals in our country, yet it is believed that some extracts from it (in appendix No. 3) will not prove an unacceptable addition to this report. Different varieties are of course adapted to different soils and climates.

The following is a notice taken from a public journal respecting a kind called the China or hardware wheat, said to have been originally found in a crate of China ware, imported from the north of China, and by the way of Canada introduced into this country. It is said to average from 150 to 180 grains to the head, and that it will yield from 45 to 50 bushels to the acre, and ripens 8 or 10 days sooner than any species of wheat. The crop is said to have been ripe at an early date.

Mention is made in some of the papers of a species of wheat, in the vicinity of Cincinnati, called Alabama wheat, from the fact that half a pint was brought from that State in 1839. It is said that 2,000 bushels of this variety has been raised in 1844, in the Whitewater valley, and that it takes the preference over all the wheat brought into the market at Cincinnati, weighing from 64 to 68 pounds to the bushel, and the yield averaging 30 bushels to the acre. Some of this variety may perhaps be received for distribution this winter at the Patent Office.

The Black Sea wheat, a spring wheat, has been already alluded to as a favorite variety in Vermont. It is said to be very hardy, free from rust, and produces a better yield than any other of the varieties there cultivated, especially on unfavorable soils. It is stated, by one conversant with it, that he believes it will yield better there than rye, even where rye has heretofore been considered the safest crop.

The flint wheat is highly commended in Michigan, and it is stated, that where it is used it is quite free of the fly. One person says, that in Unadilla were two fields immediately adjoining each other, of like soil, and both prepared and sown alike, and about the same time, one with

white flint and the other with the bald red-chaffed variety. "The flint stands fair, while the red-chaff is not worth harvesting and threshing. The flint also is considered less liable to rust."

The Mediterranean wheat seems still to meet with favor, although some doubt whether, on its improvement by cultivation, it will be found to resist the attacks of the fly and the rust. One of the most decisive trials of its value is found in the account given in some of the agricultural journals of the experiment of Major H. Capron, of Laurel Factory, Prince George's county, Maryland, who, it is stated, made from this variety of wheat, in twenty acres of land, at the rate of forty-three bushels to the acre, when five years ago the soil would not have yielded seven bushels of oats to the acre. The blue-stem wheat distributed the past year is also considered as a valuable kind for cultivation.

The agricultural journals and reports of societies have abounded with accounts of individual crops, which show a large increase on the usual average yield. The following are a few of the interesting facts relating to the production of this grain. "Mr. J. Underwood, of the town of Middlesex, in the State of New York, cut fifty-two bushels and fifty-six pounds of wheat on one acre, selected from about thirty, which he thought would yield the same amount." Some of this seed has been sent for, to distribute from the Patent Office this winter.

Again: a specimen of white flint wheat, raised by Myron A. Adams, of East Bloomfield, New York, is mentioned, one hundred and seventy-four pounds of which produced one hundred and forty-four and a half pounds of flour, and thirty-two pounds of bran and middlings, averaging forty-eight pounds of flour to the bushel.

The following is taken from the Baltimore American:

"*Great yield.*—We are informed that Mr. John Maught, of Middletown valley, in this State, has now growing on his farm, from a single kernel of wheat, seventy-seven perfect heads, well filled. The same gentleman has also one hundred acres of splendid wheat now fit for the sickle.

In the English papers, allusion is made to a new kind, called "Baratta wheat," which is said to be very prolific. A single stool or roost consisted of seven ears, each containing eighty corns; thus giving the product of five hundred and sixty from a single grain. Mention is likewise made, in a recent English paper, of a crop of wheat, the produce of two acres and one rood of ground, which, when threshed out, yielded one hundred and fifty-three bushels of the finest quality.

As showing the possible extent to which the culture of wheat may be carried, the following, extracted from an agricultural journal, deserves mention: "By planting the kernels just six inches apart each way, and feeding the plant on food containing in a soluble state all the elements necessary to build up its entire system, including the materials to form the straw as well as the berry, a gentleman in England has grown at the rate of three hundred and twenty bushels per acre."

The editor of the American agriculturist, from whom this statement is published, says: "It has been asserted by some, and sneered at by others in this country, that 100 bushels of wheat could be easily grown upon a single acre." It will be seen that the following little experiment in England produced at the rate of 320 bushels:

"The imperial bushel contains 2,218.192 cubic inches; the Winchester (our common bushel) 2,150.42; the imperial bushel, therefore, is to the

Winchester as 1 to 0.969447. The English quarter of wheat is 8 imperial bushels of 70 pounds each, equal to 9⅓ American bushels of 60 pounds each.

"At the end of August, 1843, I planted in my garden 32 grains of wheat, at six inches distance, an inch and a half deep; the seed was of the first-rate quality. This seed produced this year 32 plants, having from 10 to 28 stems and ears each; the average number of ears was 16; the average weight of each plant 1¾ ounce. An acre of land would contain, at six inches distance, 174,240 plants; the produce, 304,940 ounces, or nearly 19,600 pounds—320 bushels, or 40 quarters, per acre. The expense of dibbling would be more than saved by the diminished quantity of seed required. I do not mean to state that such a result would be obtained upon a large scale, but I think it is worthy of trial. When we know that the average produce is only 2½ quarters per acre, and that it is possible to grow 40, it will be allowed that there is ample scope for improvement. Try a breadth in your fields an inch and a half deep; put one grain (and one only) in each hole, plant it at six or eight inches distant. Be sure to plant good seed. Get as much produce as you can, but go for 40 quarters per acre."

More attention should be paid to the culture of the wheat crop, as, owing to the land being robbed of its appropriate chemical elements by the abstraction of the straw and the grain, the soil becomes unfitted for this grain. It is stated in the report of the Farmers' Club of New York, that the quantity there has been diminished from 30 to 10 or 15 bushels per acre. The same process seems to be going on in Ohio and other Western States, and should be checked in time. Certain chemical substances are necessary for the formation of the straw and the grain, and these should be supplied if both are carried off from the land.

Some experiments have been given in the agricultural journals, also showing the importance of the drill husbandry for wheat over the broadcast method of sowing. One of the most interesting of these is that of Charles Noble; for which, see appendix No. 4.

It will be seen that, while at least 3 pecks of seed per acre was sown, the crop also was increased 7½ bushels; so that the grain was 8 bushels and 1 peck to the acre. The amount of straw also increased 12 per cent., and the amount of grain 27 per cent. per acre. According to Sprengel's Analysis, it is stated that 1,000 pounds of wheat leave 11.77 pounds, and the same quantity of wheat straw leaves 35.18 pounds of ash. Of the straw ash, 28.70 are silica, without which substance it is impossible to grow either wheat or rye. Thus, it is plain that the agriculturist, though he may sell the grain, must not rob his field of the straw; and that a gain in straw (as made by Mr. Noble) is a real gain for perpetuating the fertility of his fields.

Dr. Noble's system of topdressing, in which he has been so successful, and which may be found in the Boston Cultivator, deserves to be read with attention, as it decisively proves that care only is necessary to make our crops far more valuable.

To apply manure directly to the wheat crop, it is said, is injurious, as it produces weeds, and forces the growth of the wheat, and renders it thus more liable to blight and rust.

The nutritious quality of flour has been ascertained, it is said, by a French

chemist; and, from several samples analyzed, he has obtained the following results:

Nuremburg bread equals	100.00
Dresden do	115.31
Berlin do	116.04
Canada flour do	117.23
Glasgow unfermented bread equals	123.15
Lothian flour equals	134.06
United States flour equals	145.03
United States flour, by chemical analysis	150.00

The more gluten flour contains, the more good bread a given number of pounds will furnish. A barrel of flour rich in gluten will give 10 per cent. more bread than one nearly all starch. The quantity of the meal-forming principle depends, it is stated, in a good degree, on the quantity of nitrogen in the soil on which the wheat is grown. The following facts are interesting, in connexion with this crop:

An acre of land, with the same labor and proportion of manure, Jacobs (Corn Law Tracts) says, will yield 300 bushels of potatoes, or 24 bushels of wheat. The food of potatoes, at 38 pounds per bushel, equals 11.4 pounds; the latter, at 60 pounds, 1.4 pounds: thus, the wheat is one-eighth of potatoes. Sir H. Davy says wheat contains three times as much mucilage, or starch, as gluten, albumen, saccharine, &c. Probably the nutricious power of wheat to potatoes is as 7 to 2, or 2 pounds to 7 pounds.

One individual, a year, consumes 480 pounds of wheat, or 1,680 potatoes. One acre of wheat will feed 3 persons, and of potatoes nearly 7 persons.

The nutriciousness and palatableness of bread depend much on the method in which it is made; and for this purpose good yeast is indispensable. The following recipe for yeast has been furnished by a baker, who has proved it abundantly. It is easily followed, as it requires no materials but such as may be obtained by every housekeeper. Were flour only well fermented when used for bread, there would be not only an actual saving of many millions of dollars, but the health and happiness of the community would be greatly advanced.

For four or five gallons of yeast, take one-quarter pound of hops; boil them until all the strength is drawn out; strain the water; add 5 pounds of common wheat flour; stir it in while it boils; also, stir in while it is boiling or hot one-half pint of malt, ground fine. If made at night, it will be ready in the morning; and if in cool weather, or put in a cool place, the yeast will keep five or six days.

The application of wheat straw to the making of paper has been known for some years; and we find it stated in a late English paper, that the finest and the coarsest kinds can alike be made, and that the experiment was soon to be tried on a large scale, as mills had been taken to Chalford for that purpose. Should this manufacture be successful, it will only be a new proof of the indebtedness of agriculture to the mechanic arts for the varied application of its products.

BARLEY.

Of the crop of barley, the information which has been received is in general very slender and indefinite. Though it has been disused as a material

for distillation, yet, in some parts of the country, it is becoming somewhat more cultivated, in place of rye, for the use of animals, &c.

The crop in Maine is thus characterized by one whose means of information are better than ordinary: "The crops of barley, when cultivated, were good; but not so much was sown this year as heretofore. The reason probably was, that barley has been cultivated pretty extensively as a substitute for wheat, as it did not suffer by the weevil. Farmers, finding that this insect was not so frequent as formerly, have returned to wheat. Barley has, however, never been raised extensively in Maine before the weevil came, and little or none is shipped."

Another person, speaking of the central part of the State, north, estimates the increase to be 10 per cent. more than in 1840; while, in the southwest section, it is thought to have "decreased yearly, for five years past, from 5 to 10 per cent."

On the whole, we believe that there was not so much raised, by 5 per cent., in Maine.

In New Hampshire, on account of the drought in the lower part of the State, east, the barley crop is thought to have fallen two-thirds from the previous year. Further towards the Connecticut, in the southwest part of the State, it is thought to have been a slight gain, perhaps 15 to 20 per cent. On the central part of the State, west, on the Connecticut river, like all the grain crops, barley is thought to have been above an average. Perhaps the increase of the crop over that of 1843 would be safely fixed at from 5 to 10 per cent.

There is not much raised in Vermont, and hence but little account is taken of it. As the season, however, was propitious for the grain crop, it is thought that there may have been a slight increase in the aggregate, of perhaps 5 per cent. or more.

In Massachusetts, in the central section of the State, there seems to have been an increase of about 10 per cent. over the crop of 1843. In the northeast part, bordering on the Atlantic, for the last five years there has been but little barley raised, on account of a worm in the straw.

In Rhode Island and Connecticut, there is very little attention paid to this crop, and scarcely any estimate can be formed, as it occupied so small a place in the view of the farmers. Seldom is there seen there a field of even a few acres devoted to barley.

The bulk of the barley crop of the whole United States is raised in New York. Yet, even here, there are large sections of the State where little or none is cultivated. It seldom, however, is the subject of distinct notice in the agricultural papers, so that it is not easy to trace the progress of the barley crop through the season of its growth. We find a few hints, which we give. Thus we notice it in the middle and also at the end of the month of July, in western New York, as "good," "proving better than for many years;" and in an agricultural paper for August, at New York, it is stated "barley has come in finely, and the crop is an unusually good one. This city is the principal market, consuming annually about 20,000 bushels."

The accounts since the harvest, also, from other sources, speak of it in the northern part of the State "as a fair average;" and, with the exception of the following, in different sections, as "an average," "about as in 1843," "fully an average crop," "full crop," &c.

In the county of Onondaga, it is estimated at one-fourth less than the year

previous; while in the county of Jefferson, and its vicinity, it is thought that it exceeded the crop of 1843 by 15 per cent.

A good judge says, from the information he has been able to gather, that it is larger than in 1843. More of this grain is cultivated this year than for some time past, and the crop is a very good one. The season has been very favorable for most of the spring crops; and it is quite probable, therefore, that the crop may be one-quarter (perhaps one-third) larger than that of last year.

With this agrees the information from the western section of the State, that "the grain is of a better quality, and the crops larger."

In Yates, Genesee, and Lycoming counties, the barley crop is estimated, by good judges, to be 50 per cent. better for 1844 than was that of 1843. In Niagara county, our informant says: "The growing of this crop has very much diminished within the last few years, on account of the progress of the temperance reformation. The crop of this year was about an average yield, though less land was sown. Very little, comparatively, is now raised, except for horse feed and making pork, though brewers both at home and abroad get a portion."

From the various information we are thus able to gather, we think there was an increase of this crop in the State of New York of from 15 to 20 per cent.

Were it not for the falling off in some of the counties, we might perhaps be justified in rating its advance over the crop of 1843 at 25 per cent.; but, all things considered, we prefer the lower estimate.

In New Jersey and Pennsylvania little is raised, but it seems to have been an "ordinary crop;" "as good as in 1843." Still, the quantity is so small as to attract comparatively little notice, so that no very reliable estimate can be formed. Compared with the crop of 1843, it might have been perhaps 5 per cent. increase.

Others possibly would rather fix it at as much the other way. In but one district, the northwest section of the State of Pennsylvania, do we find any decided increase noticed. There it is said to have been 25 per cent. over the crop of 1843.

Though Virginia stands pretty high on the comparative list of the States raising this crop, yet we have been unable to obtain any data to enable us to speak with any assuredness as to the advance or decrease of the barley product.

It seems probable that there may have been a slight increase, but so small that it will not vary much from the crop of 1843.

The State of Ohio furnishes a barley crop larger than any of the Western States but Michigan. The information for the most part from this State of this crop, for 1844, is, that it was a "usual crop," "average."

In the central part of the State, north, comprising Delaware, Marion, and Richland counties, we are told that the crop was about ten per cent. over that of 1843. In the vicinity of Dayton, a good judge thus writes: "Owing to an increased demand for barley, it is probable that twice as much was reaped this year as last, but there was not more than half a yield."

The cause of the failure is stated to have been "the wet weather." For the whole State, we think there may have been an increase on the crop of 1843 of from 5 to 10 per cent.

In Indiana and Illinois, although there was not much raised, yet it is thought to have been an average crop; and, in the western part of the latter, by some was estimated at 10 per cent. increase over the crop of 1843.

Michigan ranks high among the barley-producing States; and compared with the crop of 1843, which was a poor one, there has been a gain.

In the eastern and northern section, it is estimated at an average crop, while at the west it is said to have been "unusually good," and "more than an average crop." Still, there have not been causes to produce an unusual demand, and therefore attention has not been more than ordinarily turned to it, so that the advance is to be attributed to other causes than the unusual occupation of a great quantity of field; and therefore the whole average for the State cannot be ranked higher than 10 per cent. over the crop of 1843. The whole barley crop for 1844 is supposed to have been 3,627,000 bushels.

Mention has been made in some of the papers of a kind of barley termed the Emur or wheat barley. The person said to possess it has been written to for a sample, and some further information respecting it.

The account, so far as given, is, "that it has been raised in Lancaster county, Pennsylvania. The straw of the grain is similar to that of the common barley, with the same formed ear externally; but it is not attached to the grain, that being formed like wheat, of course without husks; and this is the cause of its great weight, which is about 60 pounds to the bushel. Its growth is precisely similar to spring barley, requires to be sown at the same time, and used for the same purposes; and, thus far, has succeeded quite as well as the common barley." The original quantity, it is stated, was about a table spoonful, and has been cultivated for three years. It is hoped that some of the seed will ere long be received at the Patent Office for distribution, as it has been requested from the person said to have it.

OATS.

On referring to the tabular estimate of the crops, it will be seen that the year 1844 has been a very favorable one for this crop, and that the increase or gain on the previous year is large. The year 1843, it will be recollected, fell off in the aggregate, from the year before it, which was more than an average one. The weather the past season seems to have been propitious to this great crop, which appears to be viewed with favor in nearly all the States.

The New England crop was evidently superior to that of the former year; though it will be seen there may have been sections which are exceptions. In Maine, it is estimated at "10 per cent. advance;" and our informant, well able to judge, writes: "An excellent yield of oats has been harvested in Maine. This grain is extensively cultivated. Large quantities are used in the logging swamps, on stage routes, in stables, and a great amount is shipped. The spring was favorable for getting them in, and the cool summer congenial to them, and the berry filled well." The advance we are inclined, from all we can ascertain, to set as high as 20 or 25 per cent. for the whole State.

In New Hampshire, the appearance of the crop seems to have been very similar. One person thinks it was "about the same as last year;" another estimates it "above the common average;" another, "an average crop;" another, perhaps better fitted than most to form a correct opinion, says that "oats sown before the 10th of May have been an excellent crop; those sown after run the risk of blight." The oat crop, for the whole, could

not have been less than a gain on that of 1843 of 15 or 20 per cent.—perhaps larger.

In Vermont, likewise, the oat crop has increased. It is said to have been "very good; better than the year previous," which somewhat fell off from that of 1842. In Franklin county, like the wheat, it is said to have been very fair. From all we can learn, we feel justified in fixing it as high as 15 to 20 per cent. better.

In the northeastern section of Massachusetts, though it was a good crop, yet it is thought to have been, perhaps, 10 per cent. less than in 1843. In the central and other parts of the State, the product was better.

In Berkshire county, in July, the crop, though less popular of late than barley, is said to look well.

Probably, to estimate the whole crop of the State at an advance of 10 to 15 per cent., would not be very wide of the mark.

Rhode Island is supposed not to have shared in this gain, but either to have been about the same, or it may be a little less.

In the southwestern section of the State of Connecticut, the crop of oats has been a fine one, and well harvested; in the central section it has, in many fields, proved deficient, owing to the drought in the early part of the season.

In the great State of New York, which stands foremost among the States which produce large crops of oats, from all our numerous notices, we have not a single one unfavorable. In every section it is spoken of as an abundant crop, or, at least, superior to that of 1843. It will be recollected that the crop of 1843 was decidedly less than that of the previous year.

In the month of July, in the vicinity of New York, it is stated, respecting the crop of oats: "The fields look beautiful; the heads are now filling, and the color is turning to that bright yellow that denotes that the crop is nearly ready to be cut. There is every appearance of a good yield." So in Queens county, oats are said to be most promising. Again: in western New York, from Buffalo, within the same month, we hear that "oats are generally good." Again: early in August, from the same section, the report is: "Oats have given a full crop; and if we have only a moderately dry month, they will be secured in good order." And yet, again: "Oats are all received, and the crop proved to be a very good one."

In the central part of the State, in Onondaga county, in July: "Oats are much better than usual, and the farmers count on an abundant crop."

So in the vicinity of Utica, about the same period, the crop of oats is said to promise well. An agricultural paper, also published in that vicinity, early in August, says, of this crop, that it "promises to be uncommonly heavy; straw not so large, but the heads are large and well filled. The season has been quite favorable to this grain."

In the neighborhood of New York, July 21, oats are described as being "heavy;" and a similar remark is made, that the straw is not so large, but it is said to be well headed, as the season was a good one.

The notices received since the harvest was gathered in correspond with these earlier promises of the abundant crop. On Long Island and in the vicinity of New York, it is described as being "a good crop; more than the usual yield." In Westchester county the increase over the year preceding is said, by an informant, to be 100 per cent. In Dutchess and Putnam, as "good as in 1843." The report with respect to Orange county, as given by one whose means of judging are better than ordinary, is highly favora-

ble. He says: "This is one of the staple products of our county of Orange, and the favorable season and an improved system of culture have united to make the crop this year one of the largest which we have ever grown. The grain is of superior quality, and the total yield is probably nearly double that of last year. The best crop offered for premium to our society yielded the enormous, and, with us, unprecedented amount of one hundred and eight bushels to the acre; the second best yielded seventy-four bushels and twenty-four quarts to the acre."

In Ulster and Delaware, at least "one-third more." In Columbia and Greene, "somewhat better." In Rensselaer county, the crop was "an excellent one." On the Mohawk valley, "as good as the year before." In the northern section of the State, the oat crop was also a good one. And in Jefferson county, the increase is estimated to have been 40 per cent. above the crop of 1840. Along the region of Schoharie, in quantity, says one, it did not greatly vary "from the previous year, but in quality it was superior." Another writes thus: "Oats are produced in large quantities; the average yield, however, is not higher than twenty bushels per acre, and should be forty. I raised this year from three acres one hundred and thirty-two bushels of very large and heavy oats; this was on sod ground, ploughed up in the fall, ploughed again in the spring, dragged over carefully three times, and seed to the amount of three bushels per acre used." In the counties of Oswego, Madison, Onondaga, Cayuga, and Cortland, this crop is considered "full an average one;" "about the same in quantity" as in 1843, but "better in quality."

Still further west and south, we meet with similar statements. In Genesee and Wyoming counties, it is estimated, by one well qualified to judge, at one-third more than in 1843. And of Niagara county it is said: "The crop of oats was good, though the quantity sown was less than in some preceding years, yet the average was 10 to 15 per cent. above that of 1843."

In Cattaraugus county the report is not equally favorable, for, though the usual quantity was sown, it is said "there was hardly a medium crop."

An agricultural paper, speaking of this crop in the State generally, remarks thus: "This as a grain crop may be considered as entitled to rank next to that of corn in importance. As food for horses, especially those which are employed in quick work, oats are preferable to any other grain, and constitute the most convenient food which can be given. The yield this year is generally good in most sections."

From the information we have been able to gather, we think we are authorized in estimating the oat crop for the whole State of New York, for 1844, at least 25 per cent. better than in the year preceding.

In New Jersey, likewise, the accounts are uniformly favorable. It is pronounced to have been a good crop, and by some is estimated at 50 per cent. advance on the crop of 1843. As the crop of the last year in this State was so much less than in 1842, we are inclined to believe that an advance of 30 per cent. may be allowed.

With scarcely an exception, the crop of oats in Pennsylvania which stands only second to New York, is pronounced to have been "a full crop; more than an average."

In Lancaster county, our informant says: "There has been, I think, something less than an average, owing to the want of sufficient rain." The anguage of others in various sections of the State is, "more than an aver-

age crop," "uncommonly good," "abundant crop, exceeding that of last year," &c.

In the central counties, on the upper branches of the Susquehanna, it is said to have been "30 per cent. better than in 1843, the season being more favorable." And still further north, and towards the northwest section of the State, the estimate of increase is placed as high as one-third more than in the previous year.

The crop of oats in Pennsylvania for 1844, compared with that of 1843, which was a falling off from the preceding year, seems, therefore, to have been at least 25 per cent. better.

Some complaint is found of the drought, as affecting the oat crop in Maryland; and in the central part of the State, bordering on the Chesapeake, it is even thought to have been "not more than half a crop," owing to the dry May. By others, the injury from the drought is estimated to be about 20 per cent. Probably it did not vary much from 15 to 20 per cent.

Virginia is a large producer of oats; and, so far as we have been able to ascertain, the reports respecting this crop during the last season are highly favorable. The general estimate seems to be, that the crop is a "full average one;" "very good, both in quantity and quality," owing to a favorable season. In the central southern section, bordering on North Carolina, the estimate reaches even to "100 per cent. advance on the crop of 1843," which is accounted for from the timely seeding in good order, and a moist May and June. In Bedford county, also, it is said to have been an uncommonly plentiful one.

In the western part of the State, also on the Kanawha river and vicinity, it is thought to have been 10 per cent. better than the year previous, which fell off 10 per cent. from that of 1842.

On the whole, we feel warranted, taking into view all the causes which might influence the increase, to place it at about 15 per cent.

In some parts of North Carolina, the drought affected the oat crop unfavorably, so that it probably fell off one-third from the crop of 1843. Such is the estimate with regard to the southern central section, bordering on South Carolina. In the southwest, too, a similar complaint is heard, and the product is thought to have been less. In the northwestern section, however, the reports are more encouraging, and the crop is spoken of as being a "good one." Similar, too, is the judgment of our informants respecting some of the northwestern counties; and it is believed to have been "an average crop." It is probable that there was an average advance of from 5 to 10 per cent., throughout the whole State.

The same cause (the drought) affected the progress of this crop still more in South Carolina, and probably lessened it at least 20, if not 25 per cent.

Indeed, by some it is estimated to have fallen off one-third, in consequence of the very dry spring which was experienced.

Thus a public journal in Greenville says: "The oat crop on upland is almost entirely destroyed by the drought." Again: "Oats were seriously injured by dry weather; but we should suppose that fully two-thirds of the usual quantity has been harvested in this district."

Similar unfavorable reports reach us from Georgia. Great complaint is made of injury to this crop by the drought. By some the crop is considered as about an average one.

Such is the estimate for the central western section. In the northwestern, however, the language is: "Short, on account of drought in the spring;"

"the grain crops have fallen short of what they were last year;" "decreased 50 per cent., on account of their being no price;" "the season was against oats; consequently, we raised a less quantity;" "25 per cent. short of the crop of last year, owing to the cold and wet in January and February, and drought in March, April, July, and August; I speak now per acre."

The falling off, as it is seen, was thus very considerable, and probably amounted to 20 or 25 per cent., compared with the crop of 1843.

Of the oat crops of Alabama, Louisiana, Mississippi, and Arkansas, we know but little, there being but a small yield, compared with the more prominent and staple products of these States. So far as we can form an estimate, it is favorable; and we place the crop at a slight advance, perhaps 10 per cent. above that of 1843.

In Tennessee, we are informed, that there was a decrease—in some cases it is estimated at 10, and in others at 25 per cent. less than the crop of 1843. It may be set down at about 15 per cent., on the whole. An agricultural paper, published in this State, mentions that in the Tennessee valley oats are "nearly a failure."

The oat crop of Kentucky, so far as we can judge from partial notices, was a better one than usual. Our informant, speaking of the northern central section, says that it was "very heavy and well-saved, like the crop of 1843, and equal to it." Another: "The crop was very large, and the product uncommonly abundant." In the southern central counties, the estimate is given of an advance on the crop of 1843 of one-sixth. The average increase for the whole State may therefore be fairly estimated at 20 per cent.

With a single exception, our information respecting the crop of oats in Ohio, which ranks the third in its production of this grain of all the States, is most favorable. In some of the southeastern counties it is said to have been injured by rust.

Of the eastern central counties it is said: "The oat crop is unusually good, and at least 25 per cent. greater than it was last year, or than it has usually been." In the central section the increase is estimated at "10 per cent."

In the northeast, "the crop is good. Last year it was very small. No doubt it is doubled this year, if not more. Last year, the weather was very unfavorable; this year, very favorable, and perhaps it is even more than doubled." On the northwest, and bordering on the lake, it is likewise thought to have been an advance of "50 per cent.," which is attributed mainly to the early rains in April, which were congenial to its growth. In the southwestern section, towards the centre, along the Miami valley, the report is, that "this crop will not vary materially from that of last year. The season was favorable, and the yield was very good." Still further in the same direction towards the southwest, the oat crop is viewed as about a "usual one."

Reviewing the different information, and comparing it with that of the year 1843, we are confident that we shall not overrate the average increase of the oat crop for the whole State of Ohio, at 25 per cent. Perhaps it should even be placed as high as 30 per cent., as nearer the truth.

We must allow as large if not a larger advance for the oat crop of Indiana, which appears to have been unusually good. Beginning in the southeast counties, on the Ohio river, towards the south, we are told that it was "an average crop;" lower down, and bordering on Kentucky and Ohio, in the

southeast, it is considered to have been "an abundant crop." Proceeding in a direction which will include the counties of Union, Fayette, and Wayne, &c., the oat crop was about there as in the previous year." In the central section, in the vicinity of Indianapolis, the crop was only "a medium one, and injured by wet weather in the spring." In the north section of the State, it seems likewise to have declined, so that it is said to have been three-fourths of the crop of 1843. From all that we can gather, therefore, we believe that we may safely allow 25 per cent. for the average increase of the oat crop in 1844, over that of 1843.

A very large crop of oats was gathered in Illinois. The statements which we have received are, without exception, of an important advance. In the southwest, there are said to have been "fine crops." In the same direction, bordering on the Mississippi, the oat crop is estimated to have been a gain of one-third or more; north of this it is estimated at "25 per cent. better than in 1843."

In the central and northern counties, it was a very good crop. The same is the view taken of the crop on the Wabash river and back. In an agricultural paper published at Chicago, we perceive it stated that there was a good crop; and it is even said that it was three times as good as the year previous, in middle Illinois. On the whole, we judge that the advance over the crop of 1843 deserves to be ranked as high as 25 or 30 per cent. The oats of Missouri are said to have been a first rate crop; and in Michigan, where it is a favorite crop, it is stated to have been a "good crop—one-third per cent. at least better than that of 1843;" "unusually good this year, and yielded more than an average crop." The oat crop of Michigan may therefore be set down as an advance of 25 to 30 per cent. In Iowa and Wisconsin, it is regarded as likewise a fair advance, so that an increased crop has been raised; probably it was 15 or 20 per cent. better.

With such statements, drawn from a variety of sources, we feel authorized to put the crop considerably higher than that of the previous year. The aggregate crop of oats for the United States, therefore, amounts to 172,247,000 bushels.

RYE.

This crop, although raised in all the States, yet ranks in its amount least of all the grains, except buckwheat. There is considerable variation in the estimates made respecting it for the year 1844.

In Maine, in some of the upper counties, the estimate is that it was 10 per cent. more than in 1840. Another well-informed correspondent writes, from the central section of the State: "But little of this grain has been cultivated during the past year. The crop proved good, but there is not much in market, on account of the small amount cultivated." As the crop for 1843 fell off, it is believed that 10 per cent. advance on that crop would be a fair average estimate, through the whole State, for the crop of 1844.

In New Hampshire, in the lower section of the State, it is thought by our informant that it was diminished one-half, in consequence of the drought. In the upper counties of this State, the season has been remarkably fruitful, and the crop is pronounced to have been above a common average. In the southwestern section, the crop was about the same as in 1843. In the Farmers' Monthly Visiter we find the following general statement respecting the rye of New Hampshire: "The crop of rye on all our light lands

where not injured by the frosts of last winter, has been very good; and even tolerable on fields early in the season supposed to be nearly ruined by winter-killing. Rye sown as early as the 1st of September, double the crop sown on the 1st of October, and four times as great as that sown in the middle of October." The crop of the previous year having fallen off, and the one for 1844 having been a decided gain on that, it is believed that 10 per cent. advance will not be too great for the crop thus noticed above.

But little information has reached us respecting this crop in Vermont; but, so far as we can form a judgment, there seems to have been a slight gain, perhaps 5 to 10 per cent. It is described as there having been no material variation, and the crop equal to an average.

In Massachusetts, in the central counties south, it was "about the same as in 1843." In the northern ones, towards the east, it is thought to have been "25 per cent. better than in 1843;" while still further to the north-east, and bordering on the ocean, we are told, "rye has been hardly an average crop; the straw was heavy, but the kernel was not so well filled. The multicole rye did not head at all; probably it is a winter grain. If sown in the fall, success might follow." The crop is said to have been "50 per cent. less" than in former years. Take the whole together, and with reference to the effect of the weather, there was a gain of about 10 per cent. for the whole State.

There is no material difference between this and the other New England States. If any thing, there was a better crop in Connecticut, as it is described as being a good crop; and in the central part of the State, it is said, "rye an abundant yield, and the quality very superior." As the crop of 1843 fell off from the previous year, that of 1844 may be set at 15 to 20 per cent. advance, since more of this grain is raised in Connecticut than in any other of the New England States.

The information respecting this crop in the State of New York is favorable—more so than for the previous year. In some parts of the State, having been raised principally for distillation, it has been lessened within a few years. Thus, in one of the central counties, our informant says: "Rye, none raised; cold water times drown it out." Such is the general report from the central section of the State; there is a small crop, and no material variation from the previous year.

In the vicinity of Utica, an agricultural paper says, in August: "The rye harvest has been progressing for several days; it commenced somewhat earlier than usual; the crop will be full an average one."

In the northern part of the State it is said to have been "a good crop." In Schoharie county, and towards the south, "the crop of rye was large; the yield, individually, however, is very small, and is always so; the average is seldom over fifteen bushels to the acre, and this of a grain which should produce twenty-five bushels." In Rensselaer county it was an "excellent crop;" along the river counties an "average" one; and a correspondent in Orange county says: "Rye is grown by our farmers pretty extensively, as the soil of some parts of our county is peculiarly adapted to it. The crop this year is *poor*, a considerable part of the grain having been blasted, it is supposed; in consequence of the storms of the early part of the season, when the rye was in its blossom; and the crop is probably one-third less than the average one." As there are no inducements to produce any increase of growth, it seems to follow, from the above informa-

tion, that the crop through the whole State could not have varied much from that of the previous year, the falling off in some sections having been somewhat overbalanced by the gain of others; and an allowance of 10 per cent. advance will be about a fair average estimate for the crop of 1844.

A similar estimate may be allowed to New Jersey.

Pennsylvania produces the most rye of any State in the Union, and the general report is favorable. It is variously estimated, as being "a good crop," "average," "pretty good," "very good," though in some parts the crop is said to be a "light one, having been injured by the frost in June;" and in others it is said there was much less sown than formerly. This crop being so much less cultivated than wheat, it attracts comparatively little attention; and hence the information contained in the papers, or in the replies of correspondents, is not as ample. Small patches are here and there cultivated, but these are scarcely observed by the passer-by, and cannot come into a general estimate so well as when large tracts are laid down to any kind of crop. There was, on the whole, probably an advance of 10 per cent. over the crop of 1843.

There is, comparatively, very little rye raised in the Middle or Southern States. In Virginia, in the section where it is cultivated, it appears to have been a common one, and probably the increase may be rated, in comparison with the crop of 1843, at 10 per cent.

Kentucky raises considerable rye, compared with most of the Western States; and though the production of it is said to be diminished in some parts 5 per cent. per acre, yet the crop was a fair one in quality, and unusual in quantity. The increase may have been 5 to 10 per cent.

In Tennessee, there is said to have been less seeded, and the crop was probably some 5 or 10 per cent. less than in 1843.

The crop in Ohio is but little noticed, but, so far as heard from, it seems to have been at least an "average" one, and in some cases it is even estimated in the central counties as high as "20 per cent. increase." An informant, speaking of the vicinity of the Miami river, in the southwest section of the State, says: "On account of the low price which rye brought in 1843, but little was sown for this year. The yield was excellent; but the comparative quantity produced this year, I have no means of ascertaining." Taking into consideration the fact just mentioned, that less was sown, in connexion with another, that in 1843 the yield fell off some 10 per cent., it may be perhaps no unfair estimate to allow a small increase, from the excellence of the crop, of from 5 to 10 per cent., for the average one for the whole State, over the crop of 1843.

In Indiana, Illinois, Missouri, Michigan, and the other remaining States, rye forms a very unimportant crop. On the whole, the crop appears to have done well in the first of these States, and was about an average one, and we may allow it 5 per cent. increase over that of 1843. The reports from Illinois and Michigan are yet more favorable, and the crop is "good." In the western part of Illinois, it is even estimated in one section as high as "25 per cent. more than last year;" and, likewise, in the western section of Michigan, it is stated to have been "unusually good," and that it "will yield more than an average crop." We put the increase in both these States at 10 per cent. over the crop of 1843.

With regard to the remaining States and Territories, there is scarcely any information; and the only means of estimating the crop is from the crop of 1843, together with the information respecting the season, and the

appearance of the other crops most nearly resembling it in character. The whole estimated amount of the rye crop for 1844 in the United States is 26,450,000 bushels.

BUCKWHEAT.

The buckwheat crop is the least of all the grain crops, and, except in two or three States, the amount raised in any, will reach only some hundred thousands of bushels, at most.

It is unnecessary to enter with much minuteness into the description. The editor of an agricultural paper in Maine writes us to this effect: that this grain is "not much cultivated, but the crop was very good when sown. I raised a very fair crop, which was harvested in just two months to a day from the time it was sown. It filled well; my horses are very fond of it before threshed, and will eat the straw now as quick and as heartily as they will clover hay. It was cut when about one-third of the seed had changed to a black color, suffered to wilt, then raked into a winrow, where it laid ten days, when it was got in. I propose to sow more next year, to harvest it as above, and keep it unthreshed for winter feed for horses." The crop probably, so far as it was raised, was a slight advance (say 5 per cent.) over that of 1843.

In New Hampshire and the other New England States, the ratio of increase is about the same; as we are informed the crop was good, "an average one," "very fair," "full average and good," "good, and gathered in fine order," &c.

New York, which ranks as one of the highest in the list of the States producing this grain, seems to have gained very considerably on the crop of the preceding year, which, it will be recollected, fell off from that of 1842 at least 20 per cent. On Long Island, in consequence of the drought, the crop suffered, and is less than usual. In the river counties, and those in the vicinity of the city, the crop of buckwheat is considered by some as "the same as last year;" "about an average." A very good judge of the matter, speaking of the vicinity of Orange county, says of this crop, that it "is raised by our farmers for exportation, and is considered by many among our most profitable crops. The season has been very favorable for this grain, and the crop is at least one-sixth larger than common; the quality of the grain is also uncommonly fine." Still higher up, it is pronounced to have been "very good," "excellent." In Schoharie county, our informant says: "Buckwheat is raised in large quantities, and is more profitable this year than either rye or oats. The dry weather in the month of September has injured the crop with us; the average yield is about twenty bushels to the acre." In the county of Otsego the crop is thought to have been "much more than usual." Along the Mohawk valley, about as last year. In Jefferson county the increase was probably 20 per cent., as it is estimated at 46,000 bushels, which is an increase on the census returns of about 25 per cent. In the more northern section, it is said to have been "a good crop." In the vicinity of the lake, and the central counties bordering, it is considered as "50 per cent. above that of 1843," "good, and about the usual quantity;" and also yet lower, towards the southern border, "more than an average," "a full average crop." Further west, the report is quite as favorable: thus, in Steuben and Allegany counties, it is thought, on account of the season having been better,

that the crop was "25 per cent. better" than the year previous. In Genesee and Wyoming counties our informant says that the yield was 100 per cent better than in 1843, as much was then lost, owing to the bad weather. Of Niagara county and vicinity, the report given us is to this effect: "The cultivation of this grain is increasing. The crop in the season past is probably larger and of better quality than ever before; a larger amount sown, and the season has been favorable for ripening and perfecting the grain; increase over 1843, at least 25 per cent. In Cattaraugus county, the crop is said to be "good, better than last year."

On reviewing this various information, and comparing it with the estimates of 1843, we feel authorized in placing the buckwheat crop for the whole State at an average advance of at least 25 per cent.

The estimates from New Jersey, on this crop, are equally favorable; it is called "a good crop;" and in some of the central counties it is rated even as high as 40 per cent. We have put the whole, as in New York, at 25 per cent. over the crop of 1843, which fell off some 30 per cent. from the previous year. It will be recollected that the decrease in the crop of buckwheat, in Pennsylvania, in the last report, was large. The crop of 1844, though much better, was not equal in comparative increase to that of New York. In the vicinity of Philadelphia, it is said not to have been a good crop. In some of the central counties, on the upper branches of the Susquehanna, the crop fell off from the average one, in consequence of the drought; and it is even estimated that perhaps there was "not more than one-half the usual quantity." In other sections, the general report is, "an average crop," "very good," "more than an average." Of this crop, in the southwest section of the State, it is said, "buckwheat, a heavy yield, but not so much sown last summer as in some other years." In the northwest counties, and on toward the northern central, it is believed to have exceeded the crop of 1843 by "one third." In Armstrong county, likewise, the yield was very good for the crop put in. Taking the State through, with reference to the weather, amount sown, &c., it is believed that 20 per cent. advance on the crop of 1843 is a fair allowance as the average increase for the whole State.

In Virginia and Maryland, so far as any reports can be gathered respecting this crop, it was an "average one," "good as usual." We omit the last in the table.

So little is raised in the District of Columbia, North and South Carolina, Georgia, Alabama, Mississippi, and Arkansas, that it is also thought proper to omit altogether any estimate, for these States &c., in the column of buckwheat.

The reports from Kentucky, Indiana, and Illinois, are favorable; and, although the quantity is small, there is an advance probably of 10 per cent.

In Ohio and Michigan alone, of the Western States, is the amount deserving of much notice. The crop was probably 20 per cent. better than that of 1843. For these two States the estimates are, "good crop," "good crop, never better," "average," or "usual crop," &c. We may therefore consider the whole buckwheat crop, as we have given it in the tabular estimate, at 9,071,000 bushels.

MAIZE OR INDIAN CORN.

This great crop is in high favor, but the amount raised this year is less than in 1843.

The crop in Maine promised, in the early part of the summer, to be a first-rate one. In some parts of the State, it is considered so uncertain a crop, from the season, that the farmers rely less on it than they formerly did. From one in the central part of the State, who is well qualified to judge correctly, we have the following report:

"The crop of Indian corn, contrary to the expectation of every one, turned out well—very well. The season of summer was cool. The worms made great havoc with the seed planted. We had hardly a 'real corn night' during the whole summer. It was from ten days to a fortnight later than common, and it was expected that an early frost would sweep the whole by the board. In September, however, we had a fortnight of real sultry weather. It brought the corn to maturity in grand style, and we have seldom had better bins of excellent corn than can be shown among us at this time."

Another, also speaking of the crop of corn in Maine, says, of the south-western section of the State, that "there was more planted than usual," and a "fair crop" was gathered—"10 per cent. more" than the previous year. The average increase, we think, must have been from 20 to 25 per cent. over the crop of 1843.

Respecting the crop of Indian corn in New Hampshire, the early notices are favorable. In July, it is said to "look well;" and again, in the middle of September, an agricultural journal of high authority, says: "Nearly the whole Indian corn crop, early and late kinds, in this part of the Merrimac river valley, is at this time so ripe as to be beyond the fear of injury from the frost. This crop will be excellent the present year; the well-tilled fields are extremely prolific of ears, and the ears themselves tipped with corn even to the very points." The subsequent accounts correspond with the above. In the central western section of the State, bordering on the Connecticut river, the crop is said to have been "much above common." South of this, the crop was "excellent;" at least a quarter more was raised than in 1843. The season is stated to have been "kindlier for this crop than for many years past." In the lower part of the State, further east, it is said to have been full "an average," "a good one, equal to that of last year;" and by one who is well fitted to form an accurate opinion, the remark is made, "increase of quantity, but no better crop, one-eighth." From the whole we gather, as the general result, that there was probably an increase of 20 to 25 per cent. over the crop of 1843, to which the millionth unit should be added.

The corn crop in Vermont is differently estimated at an average of 15 to 20 per cent. over the crop of 1843. It may have been about 10 per cent. gain through the whole State.

The earlier notices of this crop in Massachusetts are promising. Thus, it is said, for 60 miles from Boston, the prospect for corn is good. In Berkshire county, also, the crop is said to look well. In the northeast section of the State, we are told, since the crop was gathered, "Indian corn better than an average crop; the ears are heavy, and well ripened." West of this, it is stated to have been "10 per cent. better than the crop of 1843, and fully ripened."

In the more central counties, it is thought to have been "15 per cent. better than in 1843;" and from what we can learn respecting the whole crop, as compared with that of the previous year for this State, we believe it may be safely considered as an advance on that year of from 15 to 20 per cent.

In Rhode Island, also, there was an increase probably of about 10 per cent., though the crop in the western section of the State does not seem to have been equally good with that of the eastern. The warm autumn was favorable to the growth of this product, and the amount gathered better than ordinary.

The report with regard to the crop, from Connecticut, is highly favorable. It is said to have "come in much better than usual, and the season for its ripening having proved "favorable," the crop is said to be "abundant." The average increase of the corn crop in Connecticut over that of 1843 was equal probably to from 20 to 25 per cent.

The notices, which we find during the summer, of the appearance of the corn crop in different parts of New York are quite promising. In the western part of the State, we learn that as early as the fore part of May they had already begun to plant corn. In July, the corn crop in the vicinity of Albany is said to look well. The same is the report under the same date for western New York, Schoharie county, and also for Utica; and near the lake region, it is described as "unusually promising." Thus, in the vicinity of Batavia, it is stated, "corn never was better, and more than usual in quantity." In Onondaga county, somewhat early, the corn is mentioned as being "somewhat backward," the cool weather having affected it, though the warmer weather and rain then experienced promised to aid it. Near Buffalo, it is said to look "remarkably well." In an agricultural paper, under date of July 21, for central New York, we find the following remark as to the corn crop: "Generally looks well, the early plant being tasselled. Some of our gardens, occupying warm soils, have had green corn in market already. The field crop bids fair to make a good average."

In the vicinity of New York city, we have here the following statement as to the appearance of this crop, also in July: "This is our great crop in this part of the country. The weather, since the ground was first turned up, and the crop put in, has been uncommonly favorable. The plant had a good start before the hot weather came on, and its appearance is all that could be wished. The stalk is large, the leaf broad, and the color that dark rank green that denotes health and vigor. The ear is now beginning to set, and the silk and tassel are out. There is therefore every prospect that the crop will be a good one. Indeed, the season is so much advanced, that it cannot well be otherwise."

A month later, we gather the following notices: In the vicinity of New York, "the season has been favorable, with sufficient warm weather to bring the plant forward. The ears have filled, and there is every prospect of an abundant harvest." Again: "Corn looking well, generally; the stalks have a good growth, and the ears are abundant and well filled." Utica: "Corn promises to be fine." Some complaint is made at Syracuse of the drought, as affecting the corn, in August. Under date of Buffalo, September 2, we find it said: "Corn is generally doing well, and if the frost holds off for twenty days, we shall have a better crop than usual." So, again, from Rochester, early in September, speaking of the crop of western New York, one writes: "Indian corn crop never better." Somewhat later, (September 20:) "The warm weather has hastened the ripening of corn, which is now out of reach of frost." And in October, from Buffalo: "Corn in capital order." In the central part of the State, an agricultural journal remarks, about the middle of September: "We have not yet experienced any frost, and the corn is pretty much out of danger on that score; and,

from present appearances, a fair crop will be harvested." Again: "In the early part of the season, the temperature was rather low, and the months of May and June were of a rather moist character, but the warm temperature and seasonable showers in July produced a vigorous start, and the present prospect bids fair for a good crop." Again, in a public journal in Albany, it is stated: "The corn crop is ripening most finely. This, which in the early part of the season was so backward, has lately come forward so rapidly, that the promise is most abundant. Another week of favorable weather would place it beyond the reach of frost."

The information otherwise gained since the gathering of the crop is also highly favorable. On Long Island it is said to have been "a great yield—probably one-third more." In Westchester and Rockland counties it is said that it was "25 per cent. better than last year." In Dutchess and Putnam, and some of the other river counties, "a little better than in 1843." In Ulster and Delaware counties, "at least one-third more than in 1843." In Orange and Sullivan counties, the statement by one well fitted to judge is: "This is the most favorite grain product of our county, (Orange,) and has been very generally cultivated by our farmers for many years. A few years since, forty bushels to the acre was considered a crop to be hoped for rather than expected, whilst now such a yield is considered almost a failure. The great improvements in the mode of cultivating this crop have not only more than doubled the product per acre within the last two years, but have individually increased the sum total raised in nearly as great a proportion—the increased profits of raising the crop encouraging our farmers to cultivate this grain in preference to almost all other spring grains. The past season has been with us very favorable to this grain, and the crop is on every account a very large one—probably at least one-fifth larger than last year. The best crop offered to our agricultural society yielded one hundred and fifteen bushels and twenty quarts of grain to the acre. The second best yielded one hundred and six bushels and twenty-four quarts to the acre."

In Schoharie and Otsego counties, we are told that the corn crop "is a good one," "rather better than last year;" and, again, that it has done "extremely well, the average crop per acre probably reaching as high as forty bushels. The season here has been favorable to corn—neither too dry nor too wet; and a long spell of warm weather in the fall has brought in the crop in excellent order." In Rensselaer county, it is pronounced "a fair crop." In the Mohawk valley, it is said to be equal to that of last year—"good." In the northern part of the State, around the head of Lake Ontario and vicinity, there was an increase of "50 per cent." on the census returns in 1840. In Madison and Oswego counties, an increase of 30 per cent. In Onondaga county the crop is considered to have been a good one; but, owing to there having been less than usual planted, as also dryness in June, "less than an average one"—perhaps "10 per cent." less than in 1843. In Cayuga and Cortland counties, "more than an average crop." In some of the counties further west, as Tompkins, Chemung, and Yates, there was "more than an average crop;" and from one in the latter of these counties, who is well fitted to form an estimate, we are told "there was an increase of 40 per cent. this year over the last; severe drought last year injured the crop. I have raised this year, on one acre and three-fourths of land, one hundred bushels of shelled corn; it is called the large white corn." In Steuben and Allegany counties, also, it is described as having been "25 per cent. better than last year," as the season was also better. In the counties of Genesee and Wyoming,

too, the crop is supposed to have largely increased, and the advance over that of 1843 is placed, by a good judge in these matters, as high as "50 per cent." This region, even when in possession of the Indian tribes, was famous for its fine corn; as we find, in an account of General Sullivan's expedition into the country of the Senecas, large quantities of corn were destroyed; and some of the ears, if we recollect right, are mentioned as being not less than twenty-one or twenty-two inches long. Yet further to the north, in Niagara county and the vicinity, a correspondent informs us that "agriculturists are, to a considerable extent, applying their barn-yard manure to this crop in preference to barley, and the season past it has been uncommonly large. Sixty or eighty bushels per acre are common, and one hundred have been produced in several cases. The *causes* of this increase, which is at least 30 per cent. above 1843, are: 1st. A larger amount planted. 2d. More and a greater variety of manures have been applied. 3d. More care in tillage, keeping down weeds, and stirring the ground during the growing of the crop."

In Cattaraugas county, which is not a corn county, the crop is said to have been a medium one.

In an estimate, therefore, for the increase in the whole State over the crop of 1843, since the crop has been so fine in many of the most fruitful sections, we feel fully justified in fixing it at least as high as 25 per cent.; and we somewhat doubt if it ought not to be placed as high as 30 per cent.

An agricultural paper in this State, published since the whole crop was harvested, holds the following language: "Although this crop did not appear promising in the fore part of the season, owing to the coldness and backwardness of the spring, yet the mild and favorable weather of the latter part of the summer so well matured the plant, that the yield has generally been an uncommonly good one. In the Northern and Eastern States, as well as in Canada, we feel justified in stating that so good a crop has not been generally got for several years. This is a crop of very great consequence to all sections of the country, and, for *home consumption*, is undoubtedly of more value, every thing considered, than any other kind of grain. Well has it been said, by a distinguished agricultural writer, that it is "*meat, meadow, and manure.*" The grain affords a most wholesome and nutritive food for man and beast; the stalk and leaf afford, when properly cured, a most excellent fodder for cattle; in fact, from no grain crop can so great an amount of sustenance be raised per acre, and from none can so good a return be given to the land in the shape of manure."

The corn crop of New Jersey, also, was "better than ordinary," a "good crop," "20 per cent. more;" so that a considerable increase, as much as 20 per cent., may be fairly supposed.

We have but few early notices of the corn crop of Pennsylvania; so far as we can ascertain, it was promising. In Berks county, in June, it is stated, "corn looks advanced and healthy;" and from Philadelphia, with regard to the State generally, that the "corn promises to be plentiful." Again, with respect to Chester county, we are told "the farmers are felicitating themselves upon the flattering prospect of heavy crops of corn;" "vegetation is very forward."

Later intelligence respecting this crop is, in most respects, very favorable. In the counties of Columbia, Luzerne, and Wyoming, it is described as being an uncommonly large crop. In the central section, including those counties bordering on Centre county, it is likewise said to have been "a

very full crop—more than ever raised there in one year." Somewhat further east, it was "a good crop;" while, in the southeastern part of the State, we are told that it was "one-quarter less" than the crop of 1843, owing to the "drought;" and, again, "there was not more than two-thirds of the usual yield from the same quantity of ground planted, owing to the "drought." In the central counties, bordering on the upper waters of the Susquehanna, the increased crop is estimated at 50 per cent. over that of 1843. Indian corn "could not be more sound in the grain and large in the ear than that harvested this fall; it is far superior to the crop of last year." In the northwest section, also, it varied from "average" to "one-third more" than the crop of the previous year. Taking all the various information into view, we think it may not be far from the truth to estimate the corn crop of Pennsylvania at an advance of from 15 to 20 per cent. over the crop of 1843.

The accounts from Maryland are not so favorable; early in the season, it is said, under date of Hagerstown, and with reference to Washington county, "corn, which is necessarily short, stands well, and presents a healthy and vigorous appearance." In a public journal we find the following notice: "We have seen a good deal of the growing corn, and have conversed with a number of experienced farmers, and believe that the corn crop on the Eastern Shore will be a very small one. The stalk is unusually small, and tasseled lower than we have ever known it. On poor soils, it will not repay the expense of cultivation." Again: on the 25th of July, a person writing from Centreville, speaks thus of that vicinity: "It rained on Tuesday last, for the first time for five or six weeks. The corn fields present a sickly appearance, from the drought, and look, in many places, as yellow as they usually do in September." Since the crop was gathered, the account from the central part of the State, west of the bay, is "25 per cent. less, owing to the severe drought in May, July, and August;" and in the northeast counties, "one-third short, owing to a worm in the spring, and drought at the time of earing." Again: an agricultural journal states that the "corn crop on the Eastern Shore of Maryland is a short one," as "complaints are heard from every quarter." The crop probably fell off at least 25 per cent. from that of the year 1843.

The corn crop of Virginia seems to have suffered much from the drought. The papers of that State furnish accounts like the following: "The corn crops are cut short by the drought at least one-half on this side of the Blue Ridge." Again: "We hear of sad failures, however, along the valley of the upper Roanoke." Again, in the last of July, in the vicinity of Norfolk: "We have had several refreshing showers within the last four days, which have had a most salutary effect on vegetation, and have been of incalculable benefit to the corn." Notwithstanding this unfavorable opinion, it is also added: "As far as our information extends through the eastern counties of Virginia, we have heard "no complaints of a deficiency of the corn crop; on the contrary, the general impression is that it will be more than an average."

Other notices obtained are to the following effect: In the central southern counties, bordering on North Carolina, there was "a diminution of one-third, caused by a very dry July and August." Further north there was "a short crop, and not of a very good quality." In a southeasterly direction from the central part of the State, there was "a falling off of 20 per cent., owing to the drought of the summer." East of the central counties,

and bordering on the Potomac, the crop, likewise, was "much affected in some neighborhoods," by the same cause. In the western part of the State, there was an increase of perhaps 20 per cent. above the crop of 1843.

From the best estimate we can form for the whole, we believe that there was a lessening of the crop at least 15 per cent., compared with that of 1843.

The same cause (the drought) affected the crop extensively in North Carolina, though there were exceptions where the crop was quite good. yet the notices respecting the northwest, towards the central south, and also on the south, inform us that the crop was "one-third less." Probably, there was at least a decrease of 20 per cent., as the average for the State.

We are furnished with considerable information, gathered from the public journals, respecting this crop in South Carolina. These we subjoin, without any reference to particular order of arrangement:

"Our corn crops are very fair, having been made principally by the last rains of a month ago."—*Charleston* (*S. C.*) *Mercury.*

The Columbia Temperance Advocate says: "For several days past we have been blessed with copious and refreshing showers in and around Columbia, which have cooled the scorching heat of the atmosphere, and given new life to both the vegetable and animal world."

"*Higgins's Ferry*, *July* 26, 1844.—The corn crop is very sorry, owing to the great drought in the spring, which, in this section, lasted eight weeks. Wheat generally proved fine. Cotton looks well; it is more forward than I ever knew it before, having commenced blooming on the 6th of June."

"*Spring Grove*, *Laurens*, *July* 27.—Some of the corn is entirely dead. It has been five weeks since we have had a rain to wet the ground. I may safely say, there is a drought in every thing around us."

"*Coleman's Cross Roads*, *Edgefield*, *July* 24.—My corn is tolerably fine in prospect, although, if we do not have rain shortly, I shall not make more than half a crop; neither will any one else about here. And over in Newberry, at least next to the river, the people are literally scorched up."

"We understand," says the Camden (South Carolina) Journal of the 7th instant, "that the crops of corn in many parts of this and the adjoining districts, as well as the neighboring counties in North Carolina, are suffering much from drought. In some sections, not more than half crops are expected."

"*Higgins's Ferry*, *July* 29.—We have had a very dry spring and summer thus far in this section, and, as a consequence, crops look very sorry, especially corn. The weather too, for the most part, has been very warm. On Sunday, the 7th instant, the thermometer stood at 99 degrees at 2 o'clock, P. M., in the shade, and would no doubt have risen about 100 degrees, if a breeze had not sprung up about that time. This was the warmest day we have had in at least three summers past."

The Anderson (South Carolina) Gazette says: "Some sections of our district are literally parched up from the want of rain. The corn crop will be shorter than for many years past; while we are writing, however, the prospect for rain is good."

The Edgefield (South Carolina) Advertiser of the 21st instant says: "This part of the district has, for the last month, suffered much for rain. The corn crop has fallen off greatly, and the gardens are literally burnt up. On Monday evening we had a fine shower; and when this was written there was every appearance of more—the first of any account for six weeks."

Again, at a later date, it says: "Within the last week we have had the warmest weather we recollect having experienced, which has nearly completed the destruction of the corn crop and gardens in the vicinity of the village. We had a fine rain on Saturday evening, but we fear part of the corn was too far gone to be saved. Some of our farmers have commenced pulling fodder, fearful, no doubt, that they will lose it."

"*Pendleton, August* 2.—We have had a more general rain than our district has been favored with since early in March. In some sections, we learn that the corn crop will be remarkably short, whilst in others it is very promising."

"*Greenville* (*South Carolina*) *August* 2.—The prospect for the crops was never more flattering in the upper districts than at this time. In some neighborhoods, however, they have suffered severely from drought, and, immediately under the mountains, from too much rain."

The Fairfield (South Carolina) News of the 3d says: "After an almost [continued] drought for two months past, we have the gratifying intelligence to record of a most beneficial and refreshing rain on Wednesday and Thursday. The corn in the immediate vicinity of the borough, and other vegetable matter, have suffered considerably in that time."

Other accounts correspond with the above. In Spartanburg, Union, and vicinity, the crop was a "short one"—not more than two-thirds. In the districts of Pickens, Laurens, Greenville, &c., it was "one-fourth less, from drought;" and, if we estimate the whole falling off, it was probaby from 25 to 30 per cent., for the State, from the crop of 1843.

In Georgia, also, we have before seen, there was a great drought in some sections, and the corn crop suffered by the same. As early as May 24, at Cassville, we are told the "corn crop will be cut short, for want of rain." In the western and northwestern section of the State, especially, though there were large crops, yet they were "not so great as usual, on account of drought." Again: "25 per cent. short of the crop of last year, in consequence of the cold and wet in January and February, and drought in March, April, July, and August." The want of a market also operated unfavorably; and we are told that it "decreased 50 per cent., on account of there being no price." There is, however, one exception, in a part of the Cherokee country, in which we are told of an increase of about 20 per cent., owing to the fact "that this has been a good crop year, or a favorable season for corn." On the whole, we presume there was a falling off equivalent to the average of 25 per cent. less than the crop of 1843.

In Florida, the appearance of the crops, as we learn from the public journals, varied in different sections. Thus, it is said: "The weather still continues hot and oppressive."

"The corn crops in the vicinity of Jacksonville are almost worse than nothing. What the first drought in the spring failed to destroy has been fully accomplished by the present second one. Unless we have rain in a few days, the most serious results are to be feared.

"A gentleman recently from the interior informs us that the crops in the neighborhood of Fort King, and from that towards St. John's, are very forward and promising, and betoken rich harvests to the planters and farmers.

"Letters from the Suwannee say that the continued drought about that river has injured the crops materially, and that they will not turn out as favorable as anticipated."

The St. Augustine News learns that "very good crops of corn will be gathered in East Florida, notwithstanding the extensive drought which prevailed."

The Tallahassee Floridian of the 31st ultimo says: "Our corn crop has been unusually good this season; our planters have abundant supplies for consumption and sale."

From all that can be gathered respecting the corn crop of Alabama, it is believed to have been a good crop, and better than an average one; probably 10 or 15 per cent. better than in 1843.

In the upper part of Louisiana, in the vicinity of Washita, it is said: "The corn crop is particularly fine throughout this whole section of country. In Arkansas, also, in the counties bordering on the Washita and its branches, we are informed by a gentleman just from there, that the corn looks exceedingly well." Though in portions of these States it suffered from the overflow, yet it is believed to have increased from 10 to 15 per cent.

The same was the case in Mississippi, where the corn crop appears to have been better in some parts, while in others it "suffered much for want of rain, and is not so large as in the preceding year." Taking the State through, by the estimate of good judges, it seems to have fallen off 10 per cent. Under date of August, it is said of this crop, in Marion county and vicinity, that it was a fair crop; and, though there had been all sorts of weather—first cold, then dry, then wet—still it was uninjured.

From the States of Tennessee and Kentucky, which raise such quantities of corn, we believe, from what we can learn, that there was a decrease on this crop. In some parts, though the corn was sounder and of better quality, the quantity fell off. The Southwestern Farmer, in November, states that, in Tennessee, the crop was such that but little could be expected from thence for Mississippi. In several southern counties in Tennessee, the crop of corn is stated to have been "one-sixth less, as not so much was planted, in consequence of the low price and the increased cotton crop." In the section of Kentucky embracing, among others, the counties of Bath, Clarke, Lawrence, Montgomery, and Morgan, the crop is said to have been "never better;" but for the whole State through, we think there was a decrease of not less than 10 per cent. Our means of judgment, however, are not so ample as for some other States.

Ohio stands high for its production of corn; and, though not attracting equal notice for record in the public journals with the wheat crop, yet the accounts early given, so far as they have been gathered, seem favorable. Thus, a Cincinnati paper says: "Between this city and Harrison, a distance of 20 miles, the corn on the Miami bottom is heavy." Again: in the same vicinity, with reference to the appearance along the Ohio river, in July, it is stated: "The rains, unless too excessive, will do no material injury to the growing crops of Indian corn, which at present are very promising." In the vicinity of the lake, towards the west, in September, it is said: "The corn crop, owing to the wet weather, looks small, but it is out of the reach of the frost." Other information is to the following effect: "In the vicinity of the lake, and on the northeast, it is said to have been good. It filled and ripened without frost. In June there was a frost, which injured some fields, and destroyed some early planted. After that, the weather was good till it was safe. Last year there was a deficiency of 15 per cent. This year the crop, it will be safe to say, is increased from 15 to 20 per cent." On the

northwest, towards the central counties, the report is less favorable; and, owing to the "wet weather about the time of planting," it is thought that there is a decrease of 10 per cent. And, again, by another, it is said: "Very poor, scarcely two-thirds of a crop, in consequence of the ." Still further towards the central part of the State, in the vicinity of Marion and Richland counties, "a wet spring" also caused a "decrease of 10 per cent." from the crop of 1843. In the southwest corner of Ohio, also, the crop is estimated as "one-third less than usual." Again, it is stated of the Miami valley: "This crop will fall short of that of last year about 25 per cent." In some counties the yield was excellent; in others very poor. The decrease is attributed to long-continued rains, which prevented proper cultivation. In the valley of the Muskingum, the southeast section of the State, on the other hand, it was unusually good, and has been rated even as high as 100 per cent. advance on the crop of the preceding year. North of this, in the eastern counties bordering on the Ohio river, the report is: "The crop is good this year, and may be estimated at 25 per cent. more than an average one; and in the southern portion of this district it is 100 per cent. greater than it was last year."

It is stated in an agricultural paper, under date of 4th of July, at Goshen, Ohio, that "corn is greatly injured by the wire worm, which has been making sad work for several years, and appears to be increasingly mischievous. It is a yellow hard worm, about an inch long, and the size of a knitting-needle. It works itself into the heart of corn before it is up, and afterwards collects around the roots, and seems to take away the juices, so that the corn makes but little progress in growing. Unless means are found to stop the work of this insect, some of the farmers talk of abandoning the crop of corn altogether."

When we recollect that, in 1843, the corn crop was but a poor one in Ohio, we feel warranted, from such accounts as we can now gather, to fix the advance of the crop for 1844 on that year at about 25 per cent.

The early prospect of the corn crop in the south part of Indiana appears to have been good, as we find notices like this in the first week in June: "In Jefferson and Jennings counties, the corn crop is doing well, though the ground has been considerably beaten and hardened by long-continued and heavy rains." In general, however, the crop was much injured by the wet season; especially was this the case in the western part of the State. In the southwestern counties, lying on the Wabash, and in the northwest section, it is estimated that "one-quarter was drowned out on the bottom lands, and the balance was light;" so that there was not, as another expresses it, "more than three-fourths of last year's crop raised." The loss is considered even greater in the central western counties, between the two sections just mentioned, and it is said to have been "very poor, on account of the weather—say 50 per cent. less than last year."

In the central part of the State, also, it is considered to have been at least but "a medium crop," having likewise there been injured by wet weather during the spring, and the overflowing of the bottom land." At the southeast, in the counties bordering on the Ohio, it was full an average crop, and by some it is estimated as being "10 per cent. better" than the crop of 1843.

The decrease on the corn crop for the whole State, we think, can hardly be less than 30 per cent. The wet weather operated also unfavorably on the corn of Illinois, especially in sections bordering on the Mississippi,

where many hundreds of acres have overflowed. From the notices in the agricultural journals, we gather the following account. In Warren county, under date of June 3d, it is stated: "Many have not planted their corn; some have not even been able to plough, on account of the excessive rains since the 1st of April; many who have planted will be under the necessity of ploughing over, their first having rotted in the ground, and the weeds having gained the mastery."

In July, "the corn on dry ground is doing tolerably well, but the prospect on the whole is poor; much of it was planted two or three times over." The squirrels were destructive, and the loss from the rains was great.

Again: "The corn crop in much of this country will be light." Also, from Quincy: "The prospect for corn is very poor; there will probably be a failure." The other accounts received are no more favorable. In the southeastern section of the State, and along on the Wabash, it is considered to have been "not more than half a crop, owing to the unusual rains." In the southwestern counties, lying on the Mississippi and its branches, the estimate is, that "two-thirds of the crop on the American bottom was cut off by the flood, and on the uplands injured early in the season by the wet and baked by the dry weather." North of this, also, on the Mississippi, it is thought to have been "50 per cent. less" than the crop of 1843.

From the central counties, the information furnished us is: "The corn crop yielded about two-thirds of an average crop. Subsequent to the rains in the spring time, succeeded a considerable drought. The joint effect was to destroy the crop on low or flat lands, and injure it on all lands." South of these central counties, it seems to have been somewhat better. The average decrease of the corn crop in Illinois, it would seem, was from 30 to 50 per cent.; and we fix it at 40 per cent. for the whole State.

Very little information has been gained respecting the corn crop of Missouri. From a notice in a public journal, we learn that in the lower counties, on the Mississippi, the corn crop was light; but in the upper counties of southeastern Missouri it promised well. Taking into consideration the state of the season, and the operation on the other crops, so far as known, we are inclined to think this crop should be rated at about the same comparative decrease as Illinois. By some, it is even put as high as one-half. We allow, however, somewhat less, on account of the additional increase by settlement.

From every part of Michigan, the account is of a good crop for 1844. Last year it fell off, but for this there has been a great increase. In the southeastern section of the State, it was probably not equal to that of some others. Thus it is said: "The corn crop was generally fine, but the aggregate amount was about the same with last year, because less was planted, owing to the season for planting being exceedingly wet." In the northeastern and western sections, embracing the remaining cultivated portions, we are told that it was "unusually good, and will yield more than an average crop." And, again: "A good crop; 30 per cent. better than that of last year."

We shall not probably be far from the truth, if, in consideration of the advancing settlements, and the increased amount of land cultivated, together with the season, we allow an increase of 25 to 30 per cent. over the crop of 1843.

The corn crops of Iowa and Wisconsin also suffered from rain in the

early season, and were not average crops. Thus, in July, it is said, after allowing for the wet season, lasting for three months: "The corn, at best, cannot be more than half a crop." Again, at Salem, in Iowa, June 30th: "The corn is very small. Some farmers here have ploughed it up when it had been replanted two or three times, and been as often drowned out by the great rains." This loss will in some measure be balanced by the increased land brought under cultivation.

It will thus be seen that there has been considerable diversity in the corn crop of the United States for the year 1844. The general estimate is thus summed up in a paper in the State of New York, which perhaps in the main is too favorable: "The corn crop in this State, as well as in the middle States, and also throughout New England, is promising, and it looks well at the West; but the continued rains before alluded to are said in many sections to have done this crop an irreparable injury. The thousands, or rather millions, of acres planted with corn, on the fertile bottoms of the Wabash, the Illinois, the Missouri, the Arkansas, the Red, and the Mississippi rivers, were overflowed in June for such a length of time that this great Western crop must thereby be diminished. But the Eastern, Southern, and Middle States will repair this deficiency, so as to make a full average crop."

The whole amount, according to the tabular estimate, was 421,953,000 bushels.

The importance of the corn crop, as well as the fact that it is so universally cultivated, and so great a favorite, has induced us to subjoin some suggestions, gathered from different agricultural papers respecting the method of planting, tillage, &c., which may be found in appendix No. 5. In the same appendix, also, will be found the report of the Middlesex County Agricultural Society, in Connecticut, on a crop raised by Mr. W. Wadsworth, of Durham, in that county and State, on a crop which yielded at the rate of one hundred and fifty-one bushels and eighteen quarts of shelled corn to the acre. Samples of this corn will be soon distributed from the Patent Office. It shows what may be done by selecting seed, and properly cultivating it. In a letter of Verdine Ellsworth, of the same State, we have an interesting account of a crop of one thousand bushels of fine corn on 8 acres, or 125 bushels to the acre—specimens of which have been received. The mode of tillage is also described in detail. (See appendix 5, as before.) Another of these papers is from the report made to the Agricultural Society of South Carolina, which may be applicable to the culture of this crop in the South. We derive from this paper the following facts relating to the consumption of corn in that State. In the years 1838 and 1839, about five hundred thousand bushels of corn were imported. From October, 1841, to October, 1842, three hundred and sixty thousand; and from October, 1842, to October, 1843, two hundred and sixty thousand bushels." This is said to show an increase of the crop of one hundred thousand bushels. But this mode of estimate is calculated to give the impression that such was the only increase; which would mislead, for the data are not sufficient on which to rest the conclusion. The increase, as we have attempted to show in the report for 1843, was larger.

In the late geological survey of New Hampshire, by Dr. Jackson, we find some interesting remarks respecting the elements of the different kinds of corn, and their comparative nutriciousness, accompanied with illustrative plates. These, with the useful deductions from the same, which he suggests, may be found extracted from his volume in appendix No. 6.

Much has been said and written respecting the use of corn stalks as fodder for cattle, &c. Some remarks and extracts from agricultural journals, on this subject, may likewise be found in the appendix. (See No. 7.)

As the corn crop has suffered so much by the drought during the last season, in various parts of the country, it may be useful to remark here, that it appears, by an experiment mentioned in some of the agricultural journals, that "corn planted last spring, in very dry, sandy soils, and when suffering from drought, on being served with a pint of ashes to a hill, revived and did well."

The subject of corn-stalk sugar, and the relation it bears to the corn crop, may be appropriately considered under the head of sugar.

Some remarks were made in a former report on the subject of broom corn. It is now stated that this seed is excellent to fatten sheep, and that they are fond of it, and will fatten better on it than on Indian corn. Broom corn is thought, by one who has thus used it, to be more valuable for sheep than oats, or any grain, pound for pound.

It is said that "large quantities of the brush of broom corn, raised in the valley of the Ohio and elsewhere, have been shipped to England within three months past, together with broom handles, for the purpose of manufacturing brooms. By managing in this way, we understand that brooms can be afforded cheaper in Great Britain than if made here and exported."

Saltpetre is often used as a preparation for the seed. Some caution is necessary in its application, as appears by a trial mentioned in an agricultural paper, in which it is stated, that where too much saltpetre was used, the kernels were reddish and decayed. The proper proportion may be ascertained by experiments, though something must depend on the nature of the soil and the circumstances of the season.

POTATOES.

When, the last year, (1843,) the potato crop was found in many parts of the country to have suffered from a new disease, it was hoped that it might prove temporary, and that during another year it would be seen that the loss was owing to some peculiarity of the season, which would not operate again; but, from the reports for the year 1844, it is to be feared the worst is not yet experienced. The crop, in other respects promising, seems to be much cut off by the evil before mentioned; and, what is still more disastrous, it appears to be extending into districts which have before been free from it. This will be seen by referring to the notices which we have been able to gather respecting it. Though an important crop for the comfort of the inhabitants of our country, yet, for some reason or other, it does not seem to engage the notice of the agricultural journals while in the earlier progress of its growth.

The soil and climate of Maine appear to be peculiarly well adapted to the cultivation of potatoes; and it has here, happily, in a great degree escaped the destruction which has caused such injury in the other New England States.

In some of the earlier notices which we find of the potato crop, we are informed that it "appears well," and "promises to be an abundant crop." Such was the result. In the southeast section of the State, it is said that "more was planted than in any previous year," and there was "a good crop, and but few have rotted; the quality is good;" and in quantity it

was at least "10 per cent. above the previous year." In the central section, and running up to the north, also, there was "an increase of 10 per cent." In some places they rotted in the ground, and this was then attributed to the "hot and dry weather." Again, from one who is well fitted to form a fair estimate, we have the following information: "Large quantities were planted, and the cool weather was very favorable for their growth; and the quantity and quality of the crop are extra. Some complaint has been made on the seaboard, and some parts of the interior, of the wet; and some farmers have lost nearly the whole of their crop; and yet the average throughout the whole territory is more than in former years, owing to the increased attention paid to the crop." It would seem probable that from 15 to 20 per cent. advance on the crop of 1843 may be allowed.

As early as May, the prospect for the potato crop in New Hampshire is said, in some of the agricultural journals, "not to be flattering;" and we accordingly find that the disease prevailed here, greatly to the diminution of the amount gathered. One of our informants in the lower part of the State says: "We think potatoes fall short about 30 per cent." Another, more to the east, says that, "though there was a full crop, yet there was a loss of 10 per cent. by the rot or disease;" and yet another good judge in these matters says, "suffering more rot—one-fourth less." In the central western part of the State, on the Connecticut river, "the potatoes were early struck with rust, and nearly one-third of the crop has rotted." Lower down, towards the southern boundary, also, the report is: "Greatly injured by the rot; all of one-third of the crop was destroyed. They suffered most on manured lands; on lands not manured, they escaped the disease entirely."

In the central section, towards the eastern border, it is said: "This crop, had it not been for the rot, would have been 25 per cent. better than in 1843; but I should think about 10 per cent. will be lost by the rot, as several farmers have informed me that they have continued to rot ever since harvested.

In the whole State, the average decrease was, we think, full 25 per cent. from the crop of 1843, which was itself less than an average one.

Vermont likewise possesses a fine soil and climate for potatoes, and the crops there are usually rich and abundant. But the crop of 1844 suffered from the general evil. The decrease is differently estimated from 10 to 30 per cent., or still higher. One person says the loss was one-third of the crop. We may fix it at 25 per cent. In an agricultural journal, we find the following remarks:

"So readily may potatoes be produced by the mellow rich soil of the northern counties of Vermont, that the price of 12½ and 18 cents a bushel, delivered at the starch mill, makes that one of the most profitable crops. In many towns, starch mills have been in operation, and it has become quite common for an ordinary farmer to raise his one, two, and three thousand bushels of potatoes in a season. In the entire Green Mountain region, from Berkshire on the south, to the Canada line on the north, there has been such a failure in the crop of potatoes that it is said there will be none left the present year for the manufacture of starch."

The potato crop in Massachusetts, in the northern section of the State, running towards the east, is described as being "full an average crop, not affected by rottenness or any new disease." Nearer to the ocean, however,

in the same direction, it is said to have been "15 per cent. short of the usual crop, as they were diseased."

In the central sections, it is thought to have been "25 per cent. less than in 1843." And in a public journal we find the following: "We passed through western Massachusetts (Hampden, Hampshire, and Franklin counties) a few days since, and found the potatoes almost every where suffering from a modification of the same disease. The tops died prematurely, before they had gained their maturity. We did not learn that the potatoes any where had commenced rotting. Some that we saw dug in Hampshire county were sound and good. The latest planted suffered the most." Again, under date from Westfield, near the Connecticut river, it is said, (November 21:) "The potato crop throughout this region has suffered severely from some cause not yet fully ascertained." Similar remarks occur in the region of Greenfield, Barre, and Pittsfield. The whole crop must, without doubt, have fallen off at least from 25 to 30 per cent.

In Rhode Island, there were parts of the State where the crop was very good, and little loss was experienced from the rot. This is stated to have been the case in the western section of the State. But in the eastern section the crop is estimated at "20 per cent. less than in 1843;" and the cause assigned is the early drought. Taking the whole State through, it seems fair to allow a decrease of about 10 per cent.

The potato crop of Connecticut fell off from 25 to 30 per cent. Indeed, some estimates in particular sections of the State place the loss still higher. Thus, of the central part, bordering on the Connecticut river, it is said, "potatoes suffered much from drought and hot weather, and the rot injured them very materially; not more than half a crop." In the southwestern section, also, it is stated that "potatoes come short; a blight on them will decrease the crop one-half; but still there will not be a scarcity."

The early notices of this crop in the State of New York are somewhat diverse. In July, in western New York, we are informed that "the potatoes on dry land look well; on wet, will not produce much." Again: "On wet land, will not produce as much as usual, but there will be an average crop." In the central part of the State, also, in July, it is said, "potatoes promise well." Again, July 11: "Potatoes look well, but farmers say they need rain very much." July 21st, an agricultural paper in this section of the State says: "The season has been favorable to this valuable crop; and, so far as we can learn, there will be an abundant yield. Young potatoes appeared in our market some ten days since, of good size and fair quality.

In the vicinity of New York, early in September, it is stated: "The early plantings have turned out well; but the late crops are in danger of being injured by the worm; some of the vines are prematurely dead."

From Buffalo, under date of September, we have the following intelligence:

"Potatoes yield well, but the rot has attacked them throughout the country. There is hardly a town in this section from which I have not heard; and, in all, this dreaded disease has made its appearance. How much it will lessen its product, is yet to be seen. In one instance, a farmer told me one-half of each hill was affected so much as to be a total loss." So, in the middle of September, the south towns of Erie county are said to have suffered great loss in this crop; and in Genesee and Wyoming counties not inconsiderable. In the vicinity of Utica, under date of August 31, the black rot is said to have injured the potatoes.

Other informants furnish the same account of the injury sustained in this State. With scarcely an exception, the evil pervaded the whole State. Thus, in the northeast, on Lake Champlain, we are told "the potato crop was much injured by rotting in the ground; and from this cause, as well as the stopping of the growth, the crop diminished one-half." At the north, it is said, "a fair crop in quantity, but injured by the rot." In the vicinity of Oswego and Madison counties, "50 per cent. decrease on the crop of 1843." In Onondaga county, "the crop is almost a failure, and will not exceed a quarter of a crop; they commenced rotting in the hill before the full-grown tops decayed." In Tompkins and Chemung counties, "quite short—-injured by disease." In Yates county, it is said that "there were more raised this year than last, but large quantities have rotted." In Seneca and Wayne, "the potato crop was small; it was injured by the drought in August and September. Potatoes that were planted early in the season were not as much affected with the rot as those that were planted late."

From Steuben and Allegany, the report which reaches us is, "half of a crop, compared with 1843, owing to disease." In some other sections, (as in Genesee and Wyoming,) it is said the crop was "much injured by disease, but the quantity saved was as large as in 1843."

In Niagara county, "potatoes have been only a medium *yield* or quality, although the disease or decay by rotting has not exceeded from 2 to 6 per cent. The crop in 1843 was light, on account of the very dry season which came on the last of May. The increase this year is probably from 5 to 10 per cent."

In Cattaraugus, where it is a favorite crop, it is stated that it was "a good crop; here and there some injury from the rot, but not extensive."

In the counties of Cayuga and Cortland, it is said, "injured by rot—crop hardly middling." An agricultural journal, in October, says: "In our last we observed that the potato crop bade fair to be a heavy one. Since then, we have heard great complaints of their failure; and the present impression is, that not more than half a crop can be relied on."

In Oneida county, it is stated, "the potato crop is nearly destroyed by rust." In the vicinity of the Mohawk valley, the crop is stated to have suffered from "50 to 75 per cent. decrease, because of the rot." In Otsego county, "a bad and small crop, much affected with rot." And in Schoharie county, an informant says: "The potato crop is small; some of my neighbors have lost their entire crop; and I should think one-half of the potatoes of the county are diseased. The largest potatoes are generally rotten. All the potatoes dug while the vines were *green below the ground* were sound; where the vines were dry and wilted, the potatoes were found more or less diseased." In Rensselaer county, it was "a very short crop, being injured by the disease." In Columbia county and vicinity, about "three-fourths of a crop." In Ulster and Delaware, "not more than half a crop, owing to the rot." In Dutchess and Putnam, "not a crop." In Westchester and Rockland, "an entire failure." "In some farms, the crop has so rotted in the ground, that scarcely any portion of them will be worth digging; and in nearly all the fields the injury has taken place to more or less extent." Similar information is given respecting the crop on parts of Long Island, near New York, where there is said to have been a "general failure." In Orange county, under date of September 21st, notwithstanding the intensity of the drought, "the po-

tatoes in this section are rotting to such an extent as to destroy nearly the whole crop." Again, one who is well qualified to form a correct opinion, writes: "This year, in many parts of the county, the crop is a total failure."

An agricultural journal published in this State, speaking of the general crop, remarks: "This crop has suffered much in many districts, from the epidemic which seems to be overspreading this country as well as the old world." "Considerable attention is justly excited, from the prevalence of this disease." "Where it has not been affected by disease, the crop of the past season has generally been a good one." To show how greatly this disease has affected this crop, it may be mentioned, that it has been stated in the papers that the Shakers of New Lebanon, who were under contract to deliver 15,000 bushels, have been obliged to publish that they could furnish none. In view of all these facts, we are fully warranted in placing the decrease on this crop as high as one-third; and probably, were we to reckon those lost since they were gathered, we might put it as high as 50 per cent.

The rot prevailed in New Jersey to some extent, but not so much in some sections as it did last year; probably the deficiency may not have exceeded 15 per cent. In the central section of the State, and bordering on the Delaware river, it is said to have been "10 per cent. less, owing to the drought;" and in yet another portion, "20 per cent. less."

The crop in Pennsylvania, though it does not seem to have been so greatly affected throughout the whole State by the rot, yet suffered severely from this disease, and also from the drought. In the vicinity of Philadelphia, it is stated to have been uncommonly good. In Chester county, it suffered much from drought, so that it is thought to be "not more than half a crop." In the rich county of Lancaster, also, it is said "there was a failure of one-half of the usual quantity, owing to the drought which prevailed." In Columbia and Luzerne counties, there was "a partial failure, on account of the rot." In the central counties, on the upper waters of the Susquehanna, the account is more favorable; and we are told that the increase was "20 per cent. over the last crop; there was but little rot, while last year there was a great deal." Somewhat lower down, embracing Dauphin and Schuylkill counties, the crop is stated to have been "one-third short;" the cause having been principally the prevalence of the rot. Towards the southwest, also, from the centre, the potato crop was "below an average."

The crop, too, in Beaver and Washington counties suffered from the rot, so that it is pronounced to have been "less than an average."

In the counties of Armstrong and Clearfield, the crop of potatoes, as appears from assessment returns, amounted to about 280,670 bushels, for the first, which is thought to have been a suitable crop. In the latter, nearly the whole crop was destroyed; and yet further to the north, and towards the northwest, the crop is said to have "increased one-third."

From the best information, therefore, we can obtain respecting this crop in Pennsylvania, it fell off from 20 to 25 per cent. from that of 1843.

In Maryland, the drought seems to have exercised a great influence in lessening the crop, so that by some it is pronounced to have been a total failure, and by others "a very indifferent crop; two-thirds short" of that of 1843. We have estimated it at from 25 to 30 per cent. decrease. The greater part of the potatoes raised, however, are the sweet potatoes.

Great complaint is heard from Virginia likewise, respecting the effect of the hot weather on the potato crop there. In the central counties, east, in the vicinity of the Potomac, it is said " the crop in some neighborhoods was much affected by drought, but in others there was an average crop." In the southern counties, bordering centrally on North Carolina, it is said that " both the Irish and the sweet potato were diminished 50 per cent., because of the dry summer. Further back, likewise, towards the interior, the crop is thought to have been " not more than half a crop," on account of " the drought. "In some other sections it was an average crop, as, in the northwestern part of the State, on the Kanawha, it is said not to have been as good as in 1843. The whole average decrease was probably from 20 to 25 per cent.

The potatoes raised in North Carolina, and others of the Southern States, are mostly of the sweet kind, and hence the crop suffered less from the drought which prevailed there. The accounts given are, "average," "good," "very good." In the southern section, however, bordering on Georgia, it is said to have fallen off one-half.

In South Carolina, in the region of Spartansburg, York, &c., the crop was very considerably lessened, and is pronounced by some to have been " not more than two-thirds of the crop of 1843," while in Pickens and Greenville, &c., it was "about the same" as in the former year. The Georgetown (S.C.) Advocate, in September, says: "Latter potatoes in this region will be a complete failure." It would seem probable that there may have been an average decrease in this crop of about from 10 to 15 per cent. In the central western section of Georgia, potatoes were a good crop. Still further north, it is said to have been 20 per cent. short of the crop of the former year, in consequence of the cold and wet in January and February, and the drought in March, April, July, and August. Similar statements, also, are made with respect to other sections of this State.

The potato crop in Alabama, Louisiana, and Mississippi, is said to have been very good, a full average, which will probably vary but little from 10 per cent. on the former year, except in Mississippi, which last year fell off very considerably; in view of which, the better crop of this year (1844) would seem to require a larger addition of from 15 to 20 per cent.

In the eastern section of Tennessee, towards the central, in a number of counties, the report as to the potato crop is said to have been "20 per cent. less" than in the year before. In the western section, also, near the central counties, it is stated that the decrease was equal to "one-quarter" of the crop, in consequence of dry weather.

The crop, on the whole, therefore, seems to have done better. In the northern central portion of the State, it is said that they were "ripe and sound, and rather more in quantity than last year;" and, again, "there is a usual crop, and the yield abundant;" while in the southern central portion, in both kinds, Irish and sweet potatoes, there was also a small " increase." It is believed, therefore, that the average increase for the whole State was about 10 per cent.

In Ohio, some sections of the State exhibit a falling off of the potato crop, which is attributed to various causes. Some variance appears respecting the fact whether the disease which has so lessened the amount produced or saved in other States prevailed in Ohio. Two intelligent informants hold diverse opinions on this point. We are inclined, however, to believe that it has partially made its appearance there, in the upper part of

the State. The southern part of the State was entirely free from it. From the information received, we learn that in the Miami valley, in the southwestern section of the State, there was "not more than half a crop of potatoes, and these were of a poor quality." Somewhat further to the east, also, on the Ohio river, it is said, too, there was but "half a crop." In the southeast, embracing Perry and some of the adjoining counties, we are told that there was "a fair crop." Somewhat above this, towards the central part of the State, and including Stark and Wayne counties, the crop was a "good one." In the central counties of the State, (Delaware, Marion, and Richland,) the crop for 1844 "diminished" from that of 1843 "10 per cent." East of these, also, reaching to Tuscarawas county, the crop is described as having fallen "short of an average, perhaps 25 per cent." On the northwest counties, bordering on Indiana, we are told "potatoes have been extremely light, say half a crop, and most of them rotted since the gathering." Further towards the east, and central along the lake, there was perhaps "an average crop." Bordering on the lake, and in the vicinity of Elyria, a correspondent writes of the potato crop: "Not much more than half a crop, owing to the continued rains the last two weeks in August; they appear to have been drowned, so as to stop their growth." He adds: "There is, however, no appearance of the potato disease which is doing such mischief in New York; what we have are good. Some early fields were nearly out of the way of the rains, and have full yields; but the crop is probably not much more than half a one." Another very intelligent correspondent, writing from the southeastern part of the reserve, as late as December 7, 1844, says: "Our potatoes in this quarter are not diseased. Kinsman, in this county, is about thirty-five miles from the lake, and is the farthest south of any place known to me where the potato is defective in this quarter. The disease was not observed there until the crop was gathered and housed. It has since appeared to a limited extent. It was very common at Twinsburg, in the north part of the town, sixteen miles from the lake." On a review of the whole, we are inclined to the belief that there was a decrease of at least from 25 to 30 per cent. in the potato crop of Ohio for 1844.

The potato crop of Indiana appears to have been better than it was in 1843. In the southeast, bordering on the Ohio river, it is said to have been an "average crop." In the central counties of the State, a "tolerable" one; while in a southwestern direction from this, towards the Wabash, they were "scarce," the cause not mentioned. In the western central counties, bordering on the Wabash, the crop is stated to have been a "good one," more than an "average crop," 25 per cent. "over 1843."

The same was the state of the potato crop in the northwest part of the State, as compared with the crop of the previous year. Taking, therefore, into consideration the deficiency of the crop of 1843, it appears probable that there was a gain of 25 per cent. over the crop of that year.

The accounts of this crop from different parts of Illinois are quite diverse. In the southeastern section, on the Wabash, and back towards the interior, we are informed, that it was "a good crop." The same is the case with the western central counties lying along the Mississippi, where the crop is thought to have been "10 per cent. more" than in 1843. On the other hand, in the southwestern section of the State, it is said there was "not more than three-fourths of a crop, it having been injured by the same cause as the corn." In the northern central counties, also, as Putnam, Marshall,

and others in their vicinity, it is stated that "potatoes were injured by the bad season, and about half or one third only of a crop was raised in the State." Of the region of Chicago, a correspondent, who is a good judge in these matters, says there was "a small crop, though the quality was good." We are inclined to believe, in view of the destructive rains, which have been noticed in reference to other crops, which flooded the bottom land in this State, that the potato crop was materially injured; and that, as compared with the crop of 1843, there must have been a falling off of from 15 to 20 per cent.

We have but very little information respecting the potato crop in Missouri. In some places it is stated to have been an average crop. Along the Mississippi, Missouri, and their branches, it must doubtless have been affected by the rise of the rivers; and by the same comparison with the effect of the season on other crops, we feel warranted in concluding that there was an equal deficiency with that of Illinois. We should be glad, had we better data to base our estimate on. The deficiency will probably overgo rather than fall short of our calculation.

The information which we have obtained respecting the potato crop of Michigan, in every section, represents it as better than in 1843. In the southeastern part of the State it is said to be "far superior to that of last year—perhaps 25 per cent." North of this, the report is, "a good crop on dry land; on wet land, poor; on the whole, about 30 per cent. better than last year, when, in consequence of the dry season, they were very poor." In the western part of the State, our informant says that the crop was "unusually good this year, and will yield more than an average crop." Probably, the average increase on the crop of 1844, over that of 1843, was fully equal to from 20 to 25 per cent. The crop of potatoes, also, in Iowa and Wisconsin, was good, and a considerable increase over that of the previous year.

In the review of the whole country, it will be seen there has been an evident falling off; and although the disease, or rot, is not mentioned in a number of States, yet the crop itself seems to have greatly suffered.

The whole crop, as given in the tabular estimate for 1844, is 99,493,000 bushels, which is probably too large rather than too small.

The sweet-potato crop is evidently, on the whole, better than that of the Irish potato. Several agricultural papers, and other public journals, express the opinion, decidedly, that there is not more than one-third or one-half a crop in the whole country. We believe this to be too large a deduction, and yet we may have fallen short in our estimate of the full increase. We have endeavored to avail ourselves of the light within our reach. The experiment seems making, as to the raising of the sweet potato further north than before; and we see it stated that a successful trial has been made as far north as Oneida county, New York. This must have probably been owing to some peculiarity of the season; nor could the potatoes have been of equal richness to those raised in more southern latitudes.

Considerable discussion has taken place in the agricultural journals, on the comparative advantages and disadvantages of hilling potatoes. Both have their advocates; but the result of experiments is apparently in favor of not hilling. Thus it is said that two unhilled rows gave five pecks, while two which were hilled gave only four pecks.

With this, also, is somewhat connected the question, whether or not manuring of the potato should be in the hill. A writer in an agricultural

paper of high repute holds the following positions on this subject: 1st. "It has been proved, by trial, that the first crop is invariably smaller when land is manured in the hill; and if the fruit is poorer, I suppose there is not the least doubt that the succeeding ones will be." He refers to a trial both with corn and potatoes, in each of which the position he maintains was borne out; for he says there was not more than two-thirds as great a crop on the part manured in the hill as in the others. 2d. "Potatoes manured in the hill, in nine cases out of ten, are eaten badly by the worms." 3d. "When manure is put in the hill, the potatoes grow too rank in the earlier part of the season; too much of the essential part of the manure is expended in promoting the growth of the tops." 4th. "Corn and potatoes, as well as every thing else, when the manure is spread on, will endure the drought much better than if manured the other way;" "the seed being planted on the manure, the roots grow too near the top of the ground; and by hoeing the hill being increased, the rain runs off as from a stack of hay, watering between the hills, and leaving the hills dry." The use of gypsum as manure for potatoes is said to have been well tested in Yorkshire, England, where the gypsumed rows produced a much finer crop than as many others not so prepared. The sets were dipped in powdered gypsum and planted in trenches, a little more gypsum sprinkled on them, then filled up, and a small quantity more sprinkled on.

We find in an agricultural paper some interesting remarks on the selection of seed for the potato crop, taken from a foreign journal, which we have transcribed into our appendix, (see No. 8,) as useful at the present time, though not immediately occasioned by the disease. In the same appendix, we have also added an extract from some editorial remarks in the New England Farmer on the same subject; and likewise some selections from the Quarterly Journal of Agriculture. From the Farmers' Monthly Visiter we have also borrowed an article, from the London Gardener's Chronicle, with the remarks of the editor of the Visiter upon it, which may likewise be found in appendix No. 8.

The value of the potato crop in our country seems likely to be enhanced by the recent application of this plant to the making of sugar, by the conversion of its starch first into sirup, and then into sugar. Under the appropriate head of *sugar*, further on, will be found a more extended notice of this subject.

The comparative value of the potato is thus given: 100 pounds of potatoes are equal, for nutriment, to—

Meat, without bone - - -	25	pounds.
Beans - - - - -	28	do.
Wheaten bread - - - -	35	do.
Parsnips and carrots - - -	190	do.
Turnips - - - - -	300	do.
Cabbage - - - -	400	do.

The experiments of Berry & Herring establish the fact that 3 pounds of potatoes are equal, for nourishment, to 12 ounces of bread and 5 ounces of meat.

It will be remembered, in the last year's report mention was made of a new disease prevalent in sections of our country, by which the potato crop was greatly injured. It will also be seen by the notices of the crop for 1844, already given, that the potato rot or disease (as it is called) has ex-

tended and prevailed far more than in the year previous. So great has been the evil, that it excites serious apprehensions, unless something may be found to prove an effectual remedy.

It is to be hoped that such will be the case, as some very able men, of those who are both scientific and practical farmers, are engaged in the discussion and investigation of the cause and remedy. Premiums, too, are offered, which will, no doubt, prove a salutary impulse to efforts for success. The country could well afford to pay a handsome sum to any one who could devise the way to insure the agriculturists of our land from the destructive progress of this threatening calamity. The first thing in the present stage of the evil is the collection of facts relating to it. Without particular reference to any one of the numerous theories which have been propounded, we have taken the pains to gather and collate all the facts which are within our reach, that we might present, if possible, a condensed view of the whole case, in the hope and belief that thus we should be able to aid others in their investigations. It is probable another year, perhaps several years, must elapse before all the conditions necessary for the forming an accurate conclusion will have been observed, in the recording of the facts in reference to its commencement, progress, and the development of the cause.

We shall here put down merely results of the comparison we have instituted, throwing the collated papers together into an appendix, that they may be at hand for any one who may wish to avail himself of them. For these, we are indebted largely, as will be seen, to the agricultural papers and public journals; and if there should be some repetition, yet it is believed it is no more than was necessary for allowing each writer to express his own views on the important subject under consideration. The whole collection, placed with scarcely any designed order of arrangement, may be found on consulting appendix No. 9.

Our remarks on this subject, for the sake of clearness, we shall endeavor to imbody in a number of distinct heads. We may not always be able to avoid their running into each other, as, though they are indeed distinct, they are likewise, in some instances, very closely allied.

1. *Extent of country embraced in the evil.*—It seems well, at the outset, to try to fix some limits to the range which has thus far been gained by this disease, or plague, as it is termed. We are not fully satisfied on this point, as it is possible that the rotting of potatoes from other causes may, in some cases, have been attributed to this particular one. But, so far as we are able to trace out its boundary, it has not, in any instance in this country, extended more than a little beyond the 45th degree of northern latitude, nor farther south than the 37th, if indeed it has gone so far. We have not observed any notices of it higher up than Piscataquis county, in Maine; along on through the central regions of New Hampshire, the line of the lakes in New York and Ohio, as far west as Cleveland. It does not seem, then, to have gone lower than a line drawn diagonally across to the northeast corner of Trumbull county, in Ohio, and so passing through a part of Pennsylvania, and reaching, in some parts, down to this District of Columbia, and perhaps portions of Virginia. We have not seen it mentioned as being discovered in Indiana, Illinois, or Michigan, though Dr. Jackson, in one of his communications, which will be found with others, seems to imply that some complaints may have been made in these States, and even west as far as Wisconsin. There seems to be none of it in Can-

ada. Its direction, so far as we can judge, has rather been from east to west—following, in this respect, the progress of insects, as has already been mentioned in another part of this report.

2. *As to the time of its first appearance in this county*, we find not less difficulty. The evil may have been partially known, but not have attracted much notice. The first distinct recognition in the public journals, so as to excite attention, was during the year 1843. It is said now, by one and another individual, as will be seen by reference to the papers in the appendix, to have been noticed here and there years ago. Very possibly, however, they may have mistaken something resembling it in its appearance as well as general results. It is likewise stated, in a public journal, that the farmers of Nova Scotia have known it for years. We cannot decide on the truth of this assertion, nor whether or not it in all respects corresponds to certain evils affecting the potato crop in Great Britain and on the continent, which it has been supposed entirely to resemble. As far as regards our own country, it seems to be comparatively, certainly it is so considered, as an alarming evil. The point of its original appearance is of some importance in enabling us to ascertain how far it may have been affected by meteorological phenomena, and therefore may be considered peculiar to the season; and thus merely temporary, or of a more permanent character. Further inquiry hereafter may elicit more ample information on this subject.

3. *The particular period of the season* in which the evil is first observed to operate, is also another which it might be useful to determine. We have attended with some care to the comparison of the various accounts in reference to this point, and we cannot find any notice which extends forward further than to the month of August. In looking at the papers of July, as will be seen of our notices of the crops, we often find the crop of potatoes mentioned as promising; but in the course of a few weeks, first in the month of August, we notice the remark that the plant begins to exhibit signs of injury. We have noticed scarcely any of these intimations earlier than the latter half of August. They seem to be more frequent, however, in the month of September. It is quite probable that there has been considerable diversity in this respect, according to the climate and soil more or less adapted to forward the growth of the plant. As far as regards the evil to the potato while in the ground, the whole time of the development of the evil is limited, throughout the entire extent where it has prevailed, to three or four weeks, and probably still less. This fact is useful, as it may lead to means of prevention. It is true, the cause may be hidden much further back; and this must be determined when the nature of the evil itself is fully understood, if it ever shall be.

4. *On the subject of the kinds of soils and methods of cultivation*, in which the disease is more or less prevalent, we have apparent facts which seem at direct variance with each other. Some point to the clayey soil as that which is least exposed, while they say the sandy and dry soils are more so. Thus, Mr. Wilson, of New Hampshire, says: "It is a fact, that on dry, warm, and highly manured land, the potato, the past season, has rotted more than on more cold airy places, with less dressing. The lake Winnipiseogee, in about latitude 42 degrees north, is a body of water of about 20 miles in length. To the north of said lake is a fine farming district, or belt of land, of about 15 miles in width; and to the north of which rise mountains piled on mountains, among which are the White Hills. On

this tract the rot has been more severe than in any other section of the State. This tract is situated in what is termed the eye of the sun; the air in August and September being heated, and the mountains at the north preventing the usual circulation, probably warms the soil more than in airy locations, where the circulation is not impeded by the mountains." Such, also, is the opinion of Mr. Perley, who tried both wet and dry; and both were affected, but dry the most. A writer in Amherst, Massachusetts, (supposed to be Professor Hitchcock,) on the other hand, speaking of this subject as it fell under his own observation, says that the potatoes in the wettest lands rotted worst. It has likewise been said that it prevailed in Ohio, both on the stiff clay lands, and also on sandy lands.

The crops on new lands are said to be less injured, and that new uplands give sound potatoes. Another says: "I planted between one and two acres on new land, with very little manure. The rot, so much complained of, has affected some, but not very badly."

Again, potatoes which were planted on sward land in Worcester, Massachusetts, are said not to be affected; but it should likewise be added, that plaster was used. Potatoes manured in the hill are supposed to have suffered more than others. Barn-yard manure is also said to be more favorable to the attacks than muck soil used as a manure. Early planting is stated by some to be beneficial in respect to its appearance; by others, it is denied that there is in this any advantage. On the whole, it would seem that no kinds of soil are absolutely free, and that the rot has prevailed in a great variety of circumstances.

5. The same may be said as to the *kinds* of potatoes. It was supposed, for a time, that the long reds, and some of the hardier varieties, were not touched; but it now appears that they, likewise, have somewhat suffered. In the New England Farmer of November 27th, it is stated that on the farm of the Hon. Daniel Webster, his long reds were badly affected, and he had lost them all. The evil, however, is stated to be more severe with respect to the Chenangos, Mercers, and Carters, and those which have been mostly highly cultivated and improved. It has been thought that seedlings would be proof against the attack of the disease; but, by the experience of Mr. Girdwood, referred to in one of the papers in our appendix, it would seem that this opinion is not correct. One person says Carters seem to fare better than Mercers. Another says that they likewise suffered. One says of the pink-eye variety, the tops are all dead, &c. Another finds the blue-noses and the orange variety are also liable to the disease.

Whether potatoes should be planted whole, or in cuts, has also been a question as to the effect. In respect to this, there seem to be examples of the injury in both cases. So, too, as to the change of seed. In some cases, persons who have purchased potatoes from a distance have had good crops. Thus, one person remarked at the Farmers' Club in New York: "In Broome county, last week, much complaint was made of the condition of their potatoes. They had Buel, Mercer, and pink eye potatoes, from a boat that came from about sixty miles north, was stopped on a bar, and had to sell out; and from these being planted, their crops are good; and from their own potatoes, their crops are bad." Others say that "changing the seed does not prevent the rot this year." One person, in New York, remarks: "I had mine from Maine and elsewhere, but they suffer."

6. The *appearance* of the diseased fruit, as we judge from the various accounts, is similar in different parts of the country. Where the tubers

are affected, it is usually found that the rot begins with a small speck on the outside, and proceeds to the interior. Some, however, speak of the inside being rotten first, while the outside remains fair. Such is stated in the New England Farmer of November, already quoted, to have been the case with Mr. Webster's. Mr. McAllister, of Salem, New York, says: "About the first of September, I opened a few hills of pink-eye potatoes having decayed tops, when hundreds of small white insects were seen on the potatoes; some of the potatoes were entirely rotten. I resolved, however, to give the subject a more thorough investigation. Having washed a few of them perfectly clean, I examined and readily discovered that there were first minute punctures through the skin, into the substance of the potato; the healthy appearance of the skin, for a short distance around the perforations, was changed to a brown color; second, a vesication or blister; third, a vegetable abscess of limited extent, filled with purulent matter; evidently showing that the potatoes were much infested by the insects, and were going to decay in consequence of the ravages of these borers; fourth, the appearance of moist gangrene, of a livid or purple color, which is only a variety of decomposition resulting from the injury inflicted by those insects."

Another person says: "I have examined diseased potatoes. In examining an apparently sound potato, small elevations are to be seen near the eye. Generally, the skin opens, and a black fungus makes its appearance. The number of black fungi having the power of bursting the skin is very great; they are termed cryptogamous. Their appearance is like a black wart, which then begins to spread itself, making an ulcerated surface. The black character soon leaves, and the sporedia succeed; these latter are of a white ash color. The potatoes become spongy, often soft and putrifying. This different termination I consider as the same disease." It is also said, in one communication, that "where the least speck of rot has begun on the outside, the stem and heart are also affected in the same ratio."

A very general agreement exists as to the effect on the vines; they appear as if struck by rust, and to wither and dry away. In some instances, it would seem that this appearance is noted to a day or night; so that vines which one day were appearing healthy and green, the next were sickly, and smitten as with the disease. In some cases, the vines are stated to have been hollow, as if worm-eaten; the rot does not seem to reach the potato or tuber, till the vine begins to be affected below the ground. In some cases, however, it is stated, that though the vines have rusted badly, the potatoes "have yielded tolerably well." As to some further *accidents*, (as they may, perhaps, be termed,) in some instances it is stated that there were no flowers and no balls on the diseased plants; that there was honey dew; that potatoes nearest the stalk were most liable; the little fibrous roots of the tuber began to decay before the tuber itself rotted; and sometimes one-half of a hill would be decayed, while the other would be sound. One person speaks of a phosphorescent light on some of his, which were stored away; but this, probably, was nothing peculiar, as such lights may be observed often in decaying substances. A peculiar effluvium is also mentioned on walking over the ground, by which it is said the presence of the rot may be partly detected. There is diversity of opinion as to whether potatoes dug early or late are most affected—some inclining to one side, and others to the contrary. The fact is stated, however, that in many cases, when dug apparently sound, and thrown into heaps, or stored away in cellars, they are often found to suffer very badly.

8. The question is asked, whether the potatoes themselves communicate *contagion*, and the disease is of the nature of an *epidemic?*

In some instances, potatoes placed contiguous to each other have seemed to be affected. The experiments of Mr. Teschmacher, mentioned in one of his papers found in the appendix, were contrary to this supposition; as he states that, where he buried a sound potato with a diseased one, at a distance of about 2½ inches, and also placed them otherwise near enough to communicate their epidemic character, had it existed, no effect followed a trial of five days. He says, however, it is possible that the trial was not long enough. Again, it is of some importance to know whether or not they are *poisonous;* and, on this point, there is considerable conflict of opinion. If not poisonous, in some places, as used, they seem to have proved unhealthy. In the New Haven Herald, a communication signed "Medicus" says: "The extraordinarily offensive smell of the potatoes affected in this manner was brought strongly to our perception yesterday. A bushel of a choice kind of a small size had been dug from a dry piece of ground in the upper part of the city. They had been placed in a shed room over night, when they were noticed by the cook, (an Irish woman,) who had heard nothing said, and had noticed no decaying ones among them. She observed that those potatoes had better be removed, as they rendered the place very offensive. The basket was emptied under the shade of a tree, and four or five small ones only were found decayed—some on one side or at one end; from each of which an offensive effluvium of great intensity emanated; and one person used to farming, &c., did not get over the effect of their influence for several minutes."

Again: it is stated in the Claremont (N. H.) Eagle, that "where the damaged crop has been put into the cellar, so offensive has been the smell arising from them, that they had forthwith to be removed and buried up in the ground." Mention has been made in the public journals as to animals who have died from eating them; but it is difficult to judge how far credit is to be attached to such rumors. From the report of a late meeting of farmers and scientific men in Boston, it seems that no one present *knew* of any such case of injury. It would not, however, be at all surprising if they had proved deleterious. The impression seems to be quite general, from some cause or other, that it is not advisable to use them as feed for animals. Very probably, the results might be different in the different stages of the disease. The tops are said to have been cut off and eaten by cattle with impunity.

9. Various theories have been propounded to account for the cause.

The views which have been advanced may be reduced to four or five—*insect origin, fungus, atmospheric influence, excess of growth* from manure, and *deterioration*, &c.

These are also capable of being considerably diversified, and sometimes two or more are supposed to be combined. Thus, under the latter mode, are found the stimulating power of manure, and the deteriorating of seed from long-continued planting; both of which are specified as particular causes.

Each advocate of a theory has brought forward and seized on facts which he supposed to favor his own views. But the difficulty is, that these facts are so numerous, of so opposite a character in many instances and in various sections of the country, that it appears next to impossible to make them harmonize with any one theory; and, from all we can see, the ultimate cause must be pronounced as undiscovered, at least with any degree of certainty.

The circumstances under which the evil has appeared, as we have already seen, are so diversified, that all the views seem more or less at fault. Still, there can be no doubt that some of the views adopted have more plausibility than others. What we still lack is careful observation, from the beginning to the end of the season, in a great number of places, systematically, referring to soils, season, accidents, varieties, &c., as we have mentioned above; and minute and accurate detail as to every particular which may legitimately be supposed to bear on the subject.

As in all other cases at the outset, for a time it has seemed as if some were on the right track, and facts appeared to concur (as has been stated) to support it; and then something would be published, on equal authority, so adverse that we are left almost as much to conjecture as before. Such is the present state of the case; and were we now to attempt to broach a formal opinion, or undertake its defence—either a new one, or some one of those already advanced—we should but add one more to the already numerous unsuccessful hypotheses. We shall therefore, condense the theories with some of the arguments, and refer for fuller acquaintance with the same to the appendix.

(*a.*) The *insect* theory has been advocated with considerable earnestness. There are two divisions of this view. By some, the injury is attributed to a little maggot, or worm, which is said to be found in the vine, or in the hill, (for both statements are given,) and which eats out the succulent part of the vine, on which they immediately wither. Mr. Hartwell says: "In connexion with all its stages, except in its most advanced decay, but especially in its incipient attacks, are found *maggots* or *larvæ*, and other creatures, which I shall call insects. The larvæ, or worms, about a line in length, are slender, with dark heads, semi-transparent bodies, and are sluggish in their movements." "The insects are sometimes invisible to the naked eye; others, a mere visible white point; and others, still, nearly a line in length, with numerous short legs, long antennæ of a white color, and extremely active and shy." Mr. Perkins also speaks of a green worm found in the eaten-out vine. Others speak of an insect which makes the potato a nidus for the perpetuation of its species, in the same manner as do the onion fly, the apple insect, &c. This writer says: "From some of the infected potatoes may be seen the insect in its pupa state escaping. In others, you may, on boiling, find the rudiments of the insect in embryo; while in others nothing will be found, the insect having escaped." Others speak of numerous little black insects, which, on the leaves and vines being disturbed, fly off. In some of the papers we find an enlarged representation of an insect, which is supposed by some to have caused the evil, "of a dark brown color, having a body shaped like the soldier ant, with the legs of the hairy garden spider; on the forebody were two projecting sockets, plainly indicating that the insects had, at some period, belonged to the winged tribe." One of our correspondents, who favors the insect theory, says that his vines "were sprinkled with small white, almost imperceptible, insects." He says, also, "during the summer, I examined fields in Dutchess, Ulster, Albany, and Schenectady counties, and invariably found insects with numerous legs; and in some instances a small worm, not unlike the apple worm in form, but red, and very minute, ensconced within the withering vine. The conclusion I came to was, that these insects fed on the albumen requisite to form the perfect tuber; and, consequently, when dry, it was either wholly decayed, from an excess having been abstracted, or, if apparently sound, so much had been taken as

to produce decay by degrees," &c. By some, who oppose the insect theory, it has been observed that these insects are only results of the injury having been done, not the cause; as insects and worms are more or less found in all decaying vines.

(*b.*) The *fungus* theory has been advanced, and very plausibly sustained, among others, by Mr. Teschmacher, of Boston, whose views will be found in his two papers in the appendix, taken from the New England Farmer.

He states that, from the peculiar smell, and the reputed poisonous qualities of the diseased potato, he was nearly certain it was a species of fungus. On examination, as he says, he found the appearances to correspond with this view; as he easily recognised, among the dark slimy mass taken from the potato, the spores, or reproducing bodies of the fungus—a kind of dark globule, which floated about in the drop of water employed in the experiment. These spores are said to be analogous to the seeds of other vegetables; and they are generated in such enormous quantities, that many fungi spread with inconceivable rapidity. Mr. Teschmacher also gives an account of other experiments, which tended to confirm him in the idea he had advanced.

(*c.*) *Atmospheric influence* is strongly insisted on, by some, as the peculiar cause of the evil. No one can deny that the atmosphere has great influence in regard to vegetation; but whether the disease be mainly attributable to this source, is not yet decided. The views of those who maintain this theory are opposite; some ascribing the injury to the *wet* weather, others to the *dry*. Last year (1843) the disease was most commonly attributed to the weather being so very wet. This year, however, there has been, in many parts of the country where it has prevailed, great drought; nor has there been uniformity in the various sections where it has been equally destructive.

A writer in the Amherst (Mass.) Express (understood to be Professor Hitchcock) inclines to the opinion, it is said, that the season has been too wet for the crop; though the quantity is stated to be less, by the register, than in two previous years. In opposition to this view, it is stated that in parts of the country where the weather has suffered for want of rain, the disease still has been found.

Thus a writer in the Massachusetts Ploughman says: "The conclusion I have come to is this—that as we had no rain in this town and vicinity from the 4th of August to the 26th of September which wetted the ground to an inch, during this interval of time, the sun has most of the time shone bright, and very hot for this season of the year; the ground being very warm, and no rains to cool it, those potatoes which had arrived at such an age in their growth became sunbaked, or burnt; the vines died immediately, and they began to rot."

Another modification of the atmospheric theory is that which ascribes it to a blight, or rust, similar to what takes place in wheat and other grain. Such is Mr. E. Abbot's view, as given in the New England Farmer, who suggests that a flow or pressure of sap was produced in the vines, which they could not sustain and elaborate; and that this fluid, descending to the tuber, corrupted the potatoes. Such, too, is the view of Mr. Elwell and Mr. Blakesley, mentioned in the Farmers' Club, New York. Mr. Bacon, of Richmond, Mass., has some interesting remarks on this subject in his communication to the Boston Cultivator, which we have extracted in the appendix.

Under atmospheric influence may, perhaps, be classed the view adopted by some, which seems to attribute the disease to a honey dew exudation. Dr. Jackson, Mr. Boyd, and some others, favor this idea. The honew dew is said to have first appeared on the stems, and was followed by the rust, with death of stems and the extension of the disease to the tubers. The fact which Mr. Boyd relates respecting a portion of a field covered with a carpet, which escaped, is thought also to be strongly in favor of this theory. He supposes the glutinous substance stops the pores, and causes death of the vines, &c.

(*d.*) By some, the disease is attributed to the *excess of growth* promoted by the use of different kinds of manure—especially barn-yard manure, and manuring in the hill. The potato is thus supposed to have been brought prematurely forward, and so exposed to the operation of the too great moisture, or too great heat, and other influences of the season. Facts are mentioned which seem to afford plausible support to this view; and whether or not mainly a cause, a predisposition may doubtless be produced by the premature ripening of the plant, by which it is rendered more liable to injury. But it is also asserted by others, that this theory will not cover all the cases of facts which are reported, since the evil has reached both manured and unmanured lands—potatoes early planted and late planted—affected by different varieties of the season. Thus, one of our correspondents says: "The cause of this uncommon failure of the potato crop was, I think, owing to the rapid growth in moist warm weather for some time, and then followed uncommonly hot weather; and, what is strange, the tops all died within a few days, without any frost, on the high ground, as well as in the ground that was low."

(*e.*) Another cause supposed for the disease, which has been strongly insisted on, either by itself or in combination with others, is the *deterioration* of the plant itself. This is alluded to in a number of communications, and seems to be extensively believed in. It is well known, that as in the case of certain kinds of pears and other fruit there is a tendency to run out by long-continued propagation, so the potato, it is thought, especially, by being continually planted on the same ground, gradually deteriorates, and needs from time to time to be renewed. This is the reason assigned why certain varieties, which have been favorites with the public, have been more subject to attack than others. The vitality of the fruit is believed to be greatly lessened, and thus a predisposition to be affected by the evil is produced. Allowing it to be a real disease, whether owing to the electric state of the atmosphere, or whatever cause which may operate to furnish a wide-spreading evil, certain kinds might thus become more easily liable to the symptoms exhibited than others. Against this view have been urged facts which seemed greatly at variance with it; though the idea is admitted, that the seed may deteriorate, and thus become less fitted for planting.

(*f.*) The opinion has been advanced, that the disease is an *imported* one. It has therefore become a question of considerable interest, whether it has prevailed abroad. It is said that a similar kind has been noticed in Germany, also in England and Ireland. We have endeavored to obtain some information on this subject from different European periodicals, but find little satisfactory. There are evidently two kinds of rot—the *wet*, and the *dry;* and the potato crop, both in Germany and in England and Ireland, has at times been subject to diseases which have greatly injured the

crop. A German newspaper quotes from a foreign journal a description of a sort of epidemic which prevailed, and which was attributed to a want of vitality in the seed, and the remedy to which was proposed by obtaining seed from abroad. But the difficulty is in determining whether it is the same thing. There are resemblances, and there are also discrepancies, so far as we are able to form a comparison in the matter.

In the Quarterly Journal of Agriculture for March, 1844, we find a paper taken from the *Livlundische Jahrbucher*, an agricultural periodical published at Dorpat and Moscow, which, as the work is not common in our country, we have thrown into the appendix with our other papers. It seems, by this article, that there has been a diversity of sentiment as to the cause. "Some," says the author, "affirm it to be a species of a fly; others attribute it to small fungi, or parasitical plants, which occasion the scab or corruption of the potato." The disease there mentioned, however, seems to be a dry rot, as is likewise the one (perhaps a still different species) alluded to in another paper, and called the dry gangrene, which was communicated by M. de Martins to the *Annales des Sciences Naturelles* of September, 1842, which is found in the appendix, among our other extracts there. Some of the suggestions in both of these articles may be profitably read.

10. *Preventives.*—Whatever may be the cause, and whether ever ascertained or not, the great thing, if possible, is to supply the remedies. These, in most instances, are based on the supposed origin; but, so far as limited observation allows, we believe that it will be found there are a number of suggestions to which it will be useful to pay some attention. In the American Agriculturist, it is said: "This disease seems to be as destructive in Great Britain, Ireland, France, Germany, Holland, and Russia, as in our own country, and is attributed to many causes. The remedies suggested are—to keep such as are intended for seed deep buried in the ground all winter; thoroughly draining and subsoiling the land where planted; to put them in small quantities; to select seed for planting, not quite ripe, and such as have not the slightest appearance of being watery; liming the land; obtaining new seed, either from planting potato balls or from distant countries, where they grow in a healthy state; after digging, spread the potatoes in the sun till they become dry and unfit for food; then stow them away till required for planting—topdressing the plant with nitrate of soda and sulphate of soda and magnesia; selecting such tubers for seed as grow near the top of the ground, and are quite green; to plant the seed whole."

We find also, in the Farmers' Cabinet of the 15th of August, the following extract from the Journal of Agriculture, by Mr. James Caird, Baldoon, Wigton, who agrees with the suggestion to plant seed not fully ripe. He says: "My seed potatoes last year (1842) were raised before they were perfectly ripe, and I have had no failure. Nearly all the seed I planted this year, however, was the small, unsaleable tubers, planted whole, rejecting the very smallest. The crop was very healthy and productive. Indeed, I have never seen a failure where small potatoes, uncut, are used for seed; and I believe this uniform success to arise from the *small* potato being unripe when taken from the ground. This opinion rests on the assumption that all the *small potatoes of a crop have not reached maturity when the rest of the crop is ripe*, as being the last formed. If this be so, it strengthens the common opinion, that the less ripened potato of

the upland districts makes the best seed. But, at the same time, we see how good seed may be had without the trouble or expense of a change from a late district, if we either plant the small potatoes of our own crops, or raise a portion for seed before they have reached maturity."

In a subsequent number of the same paper it is stated, by a correspondent, that, on conversing with an old countryman, a native of Ireland, on their mode of raising the potato, he said that "they planted their potatoes for seed late in the season, (too late for maturity,) in ground well prepared, with an extra quantity of manure, and tended them carefully; the produce was not fit to eat, but was superior for seed, producing a very abundant and sure crop." In a discussion among agriculturists in Scotland, with reference to the failure of the potato crop—the age of the varieties, nature of the soil, state of the weather, cutting and not cutting seed, were mentioned as causes. Professor Johnston remarked that, as to the remedy, all agreed that a sound, healthy seed, well-pulverized and well-drained soil, were the best preventives of the disease, and best guaranty of a good crop.

Salt, lime, and plaster, have been respectively recommended by their advocates, and, in some instances, with diverse success. An instance of the following kind has come to our notice in this vicinity, which has recently been personally examined by the Commissioner of Patents. Mr. James Cammack, a well-known horticulturist here, planted with potato cuttings three separate pieces of land, (two of which were sand and gravelly loam,) all on the 20th of June last. Those on the first piece were rolled in plaster of Paris, or gypsum, and sprinkled in the drill with the same, before being covered; another piece was prepared with compost and stable manure; and a third covered with horse dung. In this experiment, the first alone escaped the disease, and gave an excellent crop; the second was not quite so bad as the last, but both were comparatively useless. The soil for the first two pieces was alike—in one field. These facts, well attested, seem to favor the idea that heat is the great cause; and hence, that the decay of the vine may be attributed to the disease of the tuber. No maggots or insects were discovered, except such as are found in rotten potatoes generally. This would seem to show that the plaster acts as a counteraction to the too great absorption of the moisture; while the barn-yard manure produces, on the other hand, too great heat, which might prove injurious. The use of poudrette, and other artificial manures, has been recommended, on plausible grounds, at some of the discussions which have taken place. To prevent the bad effects of barn-yard manure, one writer earnestly recommends its preparation by *eremacausis,* or the process of slow combustion, as it is thought that the fermentation of the manure causes the evil.

Where lime is used, it should not be used in a caustic state, and applied directly to the seed. What is termed the hydrate of lime (*i. e.* lime with water) it is said combines with soluble vegetable and animal substances, which, on drying, or being acted upon by atmospheric influence, become insoluble in water. Gradually these compounds separate, the lime becomes a carbonate, and the organic matter becomes mould.

An instance is related where, on planting, a table spoonful of lime was placed in each hill; and, after they were up, was applied about a gill of a mixture—of lime 2 bushels, plaster 3, and ashes 8. In this case there was not one rotten potato in the fall, while in the fields of his neighbors they were much diseased.

The whole result, therefore, of the facts collected seems to show that a most widespread increasing evil has attacked the potato crop, which bears many marks of being of the nature of an epidemic, and which, unless carefully guarded against by the best means in our power, may prove destructive in years to come. It may be, that, like the cholera and other diseases with reference to persons, there are certain states of the fruit, and also circumstances, which render them far more predisposed to it than otherwise; and that, though we may not be able utterly to ward off the disease in every case, we may furnish such preventives as will be effectual in checking its extensive progress. We believe that, as in Germany and England with regard to the diseases of this crop there prevalent, we shall thus be enabled to check much of the evil. If it should lead to greater care in the choice of seed and cultivation, the present evil may eventually prove a real benefit to the agricultural community and the people at large.

HAY.

The crop of hay we believe to have done well during the past year. There is, however, difficulty in gaining much accurate information respecting its amount, either comparatively or otherwise, except in some few States, because it is not considered an object of any particular interest; and in certain States, what little is raised is confined to some particular sections.

Take New England through, the hay crop has been a good one. The season was favorable for its growth and gathering, and it was generally secured in fine order. From Maine, under date of July 19, we hear to this effect: "At Belgrade, Waterville, Fairfield, and the whole vicinity, the hay crop appears well." In the southeastern part of the State it is said to have been a "fair crop—probably about 10 per cent. above last year's," (1843.) In the northern central section, it is described as being "very large—never larger in the district;" though it is added, that a portion of it was not gathered, but rotted on the ground. By the editor of an agricultural paper, one thus well fitted to gain correct information, we are told that "a great crop of hay has been gathered in Maine this year. It is not common to have two such abundant yields as this and that of last year." It is probably by no means too large an estimate to put the increase at 25 per cent. over the crop of 1843.

The notices from New Hampshire differ in the different sections of the State. While in the western part, bordering on the Connecticut river, the account is that it was "above an average;" "a very good crop;" "more than an average, but not so much as last year, when the quantity was extraordinary;" "the quality this year is much better than the last;" in the southeastern part of the State, it is thought that there is "not more than two-thirds of a crop." Another, a good judge of crops, says of hay, compared with the crop of 1843, "better crop—increase one-fourth."

Taking the State through, there is probably an increase of about 20 per cent.

In the lower part of Vermont, the crop was "a good one, but not so good as in the year previous"—probably "about 10 per cent. less." In the northeastern, there was about the same increase. In Chittenden county it was "abundant—the crop above mediocrity." In round numbers, for that county the crop is put at "65,000 tons." In the county of Grand Isle, hay is thought to have given about 12,000 tons. In the whole of that

section there has been a considerable increase, which, probably, is equal to 15 or 20 per cent It would appear, therefore, that the whole crop, compared with that of 1843, was about 15 per cent. better.

As regards this crop in Massachusetts, the report is not favorable. The Boston Cultivator, of July 6, says that "the hay crop in this section is two-thirds of the usual one." So the New England Farmer, of July 21, says "hay is said to be light near Boston." And again: the New England Farmer, of August 31, says "the hay crop, from 40 to 60 miles around Boston, is cut off one-third." At an earlier date, also, in Berkshire county, we are informed "the hay has fallen off." Corresponding to this is the subsequent information.

An informant, speaking of the northeastern section of the State, says: "On the sea coast, two-thirds of the usual crop; in the interior, a full average." In the northeast, towards the country, it probably fell short about 15 per cent., but it was secured in the best season. Another statement, from the central part of the State, is to this effect: "10 per cent. less than in 1843." We believe that, taking the whole State through, it fell off about 15 per cent.

In Rhode Island, the report from the western half of the State is, that it was "as good as usual on good lands, but on inferior land less than usual." In the eastern part, it is stated that there were about 7,000 tons, or 40 per cent. less than in 1843. For the whole crop, therefore, we allow 20 per cent. decrease, as compared with the crop of 1843.

The information which we have been able to obtain from Connecticut, with regard to the hay crop, is much of the same cast. In the central part of this State, "it has been short," but there is said to be "sufficient to keep the stock." In the southeastern section, it is stated to have proved "a large crop." We think, on the whole, the crop has fallen off, though the rate of decrease from the crop of 1843 will not exceed 5 per cent.

There has been an average increase in the State of New York. The notices are, however, somewhat diverse in the various sections of the State. In a public journal at Albany, in July, it is said: "The hay harvest in this vicinity is over, and the crop has been secured in good condition, but it is lighter than an average."

From a New York paper of the same month, we learn respecting that vicinity: "Grass upon old meadows is quite light, and in some instances the farmers will not make hay enough to winter their stock, when usually they have had a surplus. On our meadows the yield is very large."

Yet later in August, the following notice is found in one of the public journals of that city: "The spring was highly favorable for grass, and both the high and low meadows presented a most luxuriant growth; so much so, that hay-making commenced a week earlier than usual. The weather during the whole month has been in the finest possible order. Some of our farmers have got all their hay under cover, without getting wet by even a single shower. We have never seen our barns and hay barracks better filled. July is always one of our severest and most trying months, and pastures are more apt to be parched than during any month in the year. This month has been an exception, and the grass has looked fresher than common. The cattle have been able to get a good nip, and look uncommonly fat and sleek."

In western New York, the same crop is thus described in July: "Hay light; on old meadows not half a crop; on new meadows large burdens."

Again, at Buffalo, still later: "The month of August has been very wet and unpleasant; so much so, that hay-making has been carried on at great loss and expense. There is quite a quantity of grass not yet mown, and in some places farmers have had their hay in cocks for the last three weeks. The quantity of hay raised this year will not be any thing like such as last." Somewhat earlier, in Steuben county, "the crop of hay is as good as the farmer can ask, and the weather favorable for the harvest." In Genesee county, it is said to have been a "fair crop." At Utica, the grass crop was "light." In Onondaga county and vicinity, "good." In Orange county, July 5th, "abundant." In Queens county, on Long Island, "good."

So far as we can judge from further notices of correspondents, they give similar accounts. At the north, bordering on the St. Lawrence, there was "a full crop." In Jefferson, the increase is rated as high as from "50 to 60 per cent." Along the lake, from the central part of the State to the western boundary, the account is favorable—such as Madison and Oswego, "an average crop;" Cayuga and Cortland, "good;" Yates, "average;" Genesee and Wyoming, "10 per cent. over that of 1843;" in Seneca and Wayne, "about a medium crop"—with the exception of Tompkins and Chemung, where it was an average crop, on account of drought; and Onondaga county, where we are told "the hay crop was about 15 per cent. lighter than last year, (1843,) owing, it is thought, to cold and wet weather in May, and hard frost about the 22d of May." Another informant likewise adds the drought as a reason. The crop of Cattaraugus county is also said to have been "uncommonly fine."

In Niagara county, we are informed, "this crop has been above an average, except on old meadows, or lands which have been in grass several years. In such cases, it has been light; but most of our farmers mow only two seasons, then plough up for corn or wheat. Where a regular rotation of crops is pursued, the hay crop was good. Average, it is estimated, about 10 per cent. above 1843."

From the central counties, the crop along the Mohawk valley is judged to have been about the same as last year. In Otsego and Schoharie, "a light crop; not as good as last year." In Rensselaer, "a full crop." The information respecting the river counties is, that it was "good;" "about the same as in 1843;" "average crop." In the county of Orange, we have it from high authority: "Our crop this year is about an average one. The increased fertility of our lands gives a larger yield per acre than we formerly obtained. As, however, the area accessible to navigable waters is very limited, we find this an unprofitable crop toward exportation. Its great bulk, even when pressed, renders it impracticable to transport it by horse power to any considerable distance. About the same quantity of hay, barely sufficient for our home consumption, is generally raised from year to year." On review of the whole, while we allow a considerable falling off in some sections, we think it more than overbalanced by the gain in others; and we estimate the increase at 10 to 15 per cent. above the crop of 1843.

In New Jersey the reports are in the different sections "about the same as last year;" "good;" and about "5 per cent. less." On the whole, there was, it is believed, a slight increase.

We have very little information respecting the progress of the growth of this crop in Pennsylvania, and considerable diversity exists respecting the amount gathered in the various sections. In some parts it suffered from the drought. Such was the case in Chester county, where it is thought to

have been "one quarter less," from this cause; also in Lancaster county, where it is stated that there was a "deficiency of nearly one-third," owing to the want of refreshing rain at the proper time. Further towards the centre, in Berks county, it is said to have been "more than an average yield, both in quantity and quality." In Dauphin, Lebanon, and Schuylkill counties, and vicinity, it is described as having been "a good crop." In the central counties, on the upper waters of the Susquehanna, the crop was "abundant."

Further towards the west and south, embracing Huntingdon, Juniata, and some adjoining counties, the hay crop was "below the average." In Beaver and Washington, "about an average." In Somerset county, and the adjoining sections, "as good as in 1843." Armstrong and Clearfield—in the former, by the assessment, it was about 18,000 tons, "to us a poor crop, on account of the frost of the 1st of June;" and, in the latter, "an average crop."

The crop in the northwestern section, also including Erie and some counties further to the east, along the lake and the State of New York, compared with that of 1843, is estimated at 20 per cent. increase; that in Columbia and Luzerne, "a very good growth;" while in the vicinity of Philadelphia it was but "about middling." The whole crop was probably a greater one than that of 1843, by about 10 to 15 per cent.

Hay in Maryland fell off, owing to the dry weather in the spring and early part of the season, probably full 25 per cent. It is, however, a larger crop in some sections than in 1840.

In the eastern part of Virginia, on the whole, there was about an average crop, though in some places it was diminished by the drought; west of the mountains it was better, and the increase was probably about 10 per cent. As compared with the crop of 1843, there was perhaps a small advance—probably 5 per cent. Very little is raised in many portions of the State.

In North Carolina—so far as any attention is paid to it—in the northwest, it was an "average crop;" in the southwest, "very fine;" and in the central part of the State, "one-third less, on account of the drought." Probably the whole average crop is a slight increase, but the quantity raised is small.

This is the case in all the Southern States—scarcely any hay is raised; and this year, in parts of Georgia, the crops of grain were so good, that hay was not put up for the feed of the stock.

In Tennessee, also, the hay crop did not vary much from that of the previous year. In Kentucky, in some sections, it is mentioned as being a good crop—equal to that of last year; in others, equal to "one-third" more. Probably there was an increase of about 20 per cent., as attention seems to be somewhat more turned to it.

The crop of hay also gained in Ohio. In the Miami valley, it is said by a good judge, "the hay crop was unusually fine; but a large part of it was lost in curing, owing to wet weather at the time of cutting." In the central counties, we are informed that there was "25 per cent. increase," owing to a "wet spring." In the northwestern section, bordering on Indiana and the lake, "hay has been large—a very heavy crop." Still further from this, to the east, along the lake, there was an increase of 25 per cent. In the northeast central section, also bordering on the lake, the report is: "Seldom better; the weather for cutting it was fine. Many farmers received their whole crop without a drop of rain. There is a very decided increase over the last year's crop." So somewhat lower down, on the Reserve, and bordering on Pennsylvania, also towards the centre of the

State, we are told that "hay is so abundant that it is selling at $3 per ton." In the eastern central counties, on the Ohio river, "the crop is at least an average one;" while in the southeastern section of the State there was "a full crop, and of a good quality." From all these notices, it is evident that there was an average increase in Ohio of 25 to 30 per cent. over the crop of 1843.

In the State of Indiana, also, the crop of hay was better than usual; though allowance must be made, as in other crops, for the overflow from the rivers, by which a portion of the grass product was destroyed. In the southeastern counties, inclining towards the south, on the Ohio river, there was "an average crop." In the vicinity of Dearborn, Ripley, and Franklin counties, it was "good as usual." In the central part of the State, it was "good." In the southwestern counties, bordering also on the Wabash river, "the crop was very heavy and good, though some of it was injured by wet in harvesting." In the counties still further north, and nearly central, on the Wabash, west, there was "about an average crop;" while on the northwest section, bordering on Illinois, it was probably about "25 per cent. over the last year." From the above account, it is evident that there was a very considerable increase in the crop of hay in Indiana over that of 1843, and it probably may be fairly estimated at from 20 to 25 per cent.

Similar accounts are furnished with regard to Illinois. In the southeastern section, on the Wabash, towards the central part of the State, the crop was "good." In the southwest, on the Mississippi, and embracing the counties of Randolph and Monroe, and others in their vicinity, we are told that the hay crop was "very abundant—about 20 per cent. over last year's;" "the best we have had for some years;" while, still further north, it was probably "10 per cent. better" than in the previous year. By one, in the northern section of the State, who is a good judge on such subjects, we are informed that this crop is "more cultivated each year, as the wild grass fails," and that the increase is equal to 30 per cent. He remarks, further: "Hay is becoming a crop with us. Sheep and dairy both demand it." With these data, among others, we feel warranted in fixing the estimate for the average increase of the hay crop for Illinois at from 20 to 25 per cent. over that of 1843.

In Missouri, so far as we have gained any information respecting this crop, it was also good. The amount raised is not great, but there seems to have been a gradual increase. Probably, it was equal to from 15 to 20 per cent.

Michigan raises a tolerably large crop of hay, and the notices from that State for the last crop are quite favorable. Thus, in the eastern section, it is described as having been "far superior to the last year's crop;" and perhaps the increase was "equal to 25 per cent." In the western counties it is thought to have been "10 per cent. better." In the eastern and northern, "English hay was never better; marsh hay poor, as the season was too wet." The whole increase was probably about 20 per cent.

The crops, likewise, of Iowa and Wisconsin were good; at least, it is believed, 20 per cent. increase on the crop of 1843.

The whole amount of the hay crop for the United States, for the year 1844, therefore, is estimated at 17,715,000 tons.

Hay is beginning to be somewhat exported; and could a means be devised of compressing it into still less bulk, and yet without injury to the hay itself, it is possible that larger quantities might be taken to foreign markets.

We find the following extract in a public journal published in New York: "One hundred bales of North river hay have been purchased in New York for shipment to Great Britain. This (says the shipping list) is, we believe, the first shipment of hay ever made to Great Britain from this country. To France parcels have been sent occasionally, for a year or two past."

Some new varieties of grass are gradually becoming introduced into our agriculture, of which a portion are peculiarly adapted to the southern and warm climates. These may yet be of advantage in the vicinity which is thus furnished for the different seasons, and the weather which may occur. Among these may be mentioned the Bermuda grass, specimens of which (as we see by a late number of an agricultural paper) have been sent to this country, from the West Indies, for comparison and decision whether it is indeed the same which bears that name in some of our Southern States, and which is deemed valuable for some purposes of feeding, as it loses not more than 50 per cent. in curing, and, being thick, large crops are cut from it two or three times in a season.

As it is important that the hay be cured in the best manner, we have subjoined here an extract taken from a description in an agricultural paper in New York, of the mode of making hay in Orange county, in that State:

"As to the time of cutting hay, I find a diversity of opinions among farmers. Some prefer mowing when the grass is fairly in blossom; others between the blossoming stage and the hardening of the seed; and still others when quite ripe. I am inclined to the belief that grass contains more of the nutritive properties in the middle stage than the others, and, when practicable, ought to be cut at that time.

"But that which I deem of the most importance in the hay-making process is the amount of moisture it should contain when placed in the mow or stack. On this subject there is but one opinion with our most efficient and successful graziers. I think it may be laid down as a general rule, that the more moisture the hay contains, without danger of combustion, the better. But the moisture must be the *arterial juice of the grass,* not of dew or water, nor absorbed from the wet soil. I am constrained to believe that water alone, in some form or other, causes dusty or mouldy hay, and that the juice of the grass *never does.* I had two stacks of hay put up during my absence, in so green a state that they were perfectly charred at the centre for two or three feet around, without dust or mould in any part of them, and the remainder of the stacks as profitable and good hay as I ever fed out.

"In the early stages of haying, greater care is necessary than the latter, as the grass then contains more juice; but in the latter part of July and August, we cut our grass in the morning, and mow it away in the afternoon, and often put it in cock early in the day, to prevent it from becoming dry and brittle. At this season of haying, little more is necessary than for the grass to be wilted.

"We use about four quarts of salt to a load of half a ton of hay, sprinkling it on twice while unloading; and my plan is (although not generally done) to increase the quantity of salt when the hay is too dry, and diminish it when too green, as the salt increases the moisture.

"It is not uncommon for our stacks of hay to smoke three or four weeks after put up, and the top of the mows to be thoroughly saturated with the steam. That hay which we think best preserved, has, on being opened, a light mahogany or foxy appearance; lies very compact in the stack or mow;

so much so, that it requires a vigorous arm to thrust an ordinary pitchfork one inch into it.

"The advantages of making hay on the plan I have named are great. I think we save at least one-fourth of the weight, and as much of the nutritive property of the grass; all which is obvious to those who have had an opportunity of seeing cattle fed upon hay made upon the two different plans. I will offer as a proof of this, that a farmer, on visiting me some winters since, supposed that our cows were well fed upon grain. He also remarked, that he found it difficult to bring his stock of cattle through the winter in as good condition as they were when the winter commenced. Our graziers buy their cattle from the West and North in the fall, calculating that they will gradually improve throughout the winter on hay; and this, too, without the advantages of stabling, which is so generally practised.

"Permit me to note another advantage that occurs to me. Hay is made on our plan more speedily, and with less risk of weather, and a greater quantity secured in the same space. I have heard but one objection made to hay of this description; it is, that cattle do not eat a sufficient quantity of it. Such persons judge from the bulk, and not from the weight, and make no account of the nutritive properties of the grass retained by a short, instead of a long exposure to the sun and air. I apprehend that the reason that cattle eat less of the one kind than they do of the other, is much the same that a man eats less in bulk of pork or animal food than he does of vegetable."

HEMP, FLAX, &c.

So much difficulty has been experienced in arranging and harmonizing the estimates of hemp and flax in one column, that we have in this report concluded to abandon the estimates of flax altogether. The original difficulty lay, as mentioned in an earlier report, in comprising the two together in the census returns. At the same time, after having finished our remarks on hemp, we shall also give such accounts of the flax crop, and such other particulars relating to the article, as may be useful.

Hemp is mainly confined to two or three States, of which Kentucky has for years stood foremost. Notwithstanding the early promise respecting this crop, it is believed the whole expectation has not been realized. Thus the Louisville Journal, of the 22d of August, says that the hemp crop will be "fully an average one." Again, the same journal states that "there is some complaint among those who sowed early in the season, that their seed vegetated badly, or the crop bloomed before attaining its proper height. On the whole, the crop is good. In the early-sowing district, it is now harvest, and under favorable circumstances for a good staple. Rains have been frequent, but have ceased," &c. Compared with the crop of 1843, that for 1844 has largely increased; but as compared with that of 1842, it is less. Such is the estimate in the different sections where this crop is said to be "at least double the crop of 1843, but less than that of 1842;" and elsewhere, "quantity greater than any former crop;" "product uncommonly large;" and, again, "increase of three-fourths." We are enabled to give what we believe to be an accurate estimate of the hemp crop of Kentucky, furnished us by the Hon. Adam Beatty, a gentleman to whom the agricultural community are greatly indebted for many valuable observations on various agricultural subjects, (and among others hemp,) imbodied in a published volume, and who has taken pains to acquaint him-

self with the progress of this crop in his own State for two or three years past. The subjoined extract from his letter gives such a statement of particulars as will doubtless contribute to an accurate appreciation both of the amount and the importance of this crop:

"I have obtained complete and accurate returns of all the hemp received by manufacturers and hemp dealers in the city of Maysville during the present year, up to the 27th instant; and the amount is as follows:

	Tons	cwt.	qrs.	lbs.
"Dew rotted - - - - - -	2,669	16	3	2
"Water rotted - - - - - -	81	12	3	16
"Total - - - - -	2,751	9	2	18

"Of which quantity there was manufactured at Maysville, or to be manufactured, 856 tons 15 cwt. 2 qrs. 10 lbs.; and the residue was for shipment to manufacturing establishments at other points, and for the Eastern market.

"In consequence of the low price which hemp has borne during the present year, a considerable quantity of hemp still remains in the hands of farmers. If this had been brought in, the quantity received at Maysville for the year would have been fully three thousand tons. My own opinion concurs with that of a very intelligent commission merchant at Maysville, that *about* one-fourth of the entire hemp crop of Kentucky is delivered at Maysville. I incline to think, from all the information that I have on the subject, that the above is rather an *under* than an *over estimate*. According to this estimate, the whole quantity of Kentucky hemp would be twelve thousand tons.

"It is proper to remark, that the year 1843 was an *extremely* unfavorable year for the hemp crop, whilst that of 1842 was the most favorable year for that crop which we have ever experienced. With a view of ascertaining the relative product of the two years, I procured, during the last summer, accurate returns from 144 hemp growers of Mason county, of the quantity of hemp produced by them in each of those years. The aggregate result was as follows:

	Tons.	cwt.
"Product of 144 crops in 1842 - - - - -	1,656	15
"Product from same farms in 1843 - - - -	919	14

"The product of 1843, it will be seen, was more than half that of the preceding year. But this was owing to an increased quantity of ground having been sown, as will be apparent from the following statement:

"I obtained from 80 hemp growers a particular statement of the number of acres sowed by them *each year*, together with the product, separately, for each year. These 80 hemp growers, in the aggregate, sowed, in 1842, 2,832 acres; which yielded 1,081 tons 8 cwt.—making an average of 7 cwt. 2 qrs. 15 lbs. (equal to 855 lbs.) per acre. These same 80 hemp growers in the year 1843 sowed 2,927 acres; which yielded 518 tons 10 cwt.—making an average per acre of 3 cwt. 2 qrs. 5 lbs., (equal to 397 lbs.)

"From this statement, it will be seen that the yield per acre in 1843 was less than half of that of the preceding year. The average of these two years—one *very favorable*, and the other *very unfavorable*—from the above data, would be 626 lbs. per acre, (equal to 5 cwt. 2 qrs. 10 lbs.) This would be about a fair average of the product of the entire hemp crop of Kentucky for ten years in succession.

"It is proper to remark, that *the quantity* of hemp received at Maysville

during the present year was not *diminished* in a corresponding degree with the falling off of the crop of 1843, compared with that of 1842. In consequence of the uncommon yield of the crop of 1842, and the deficiency of the market, much of it remained on hand. Such a portion of the old crop, which remained over, has been brought into market during the present year, as would probably make the entire delivery equal to an average crop.

"Upon the whole, I am of opinion that the product of the entire hemp-growing region of Kentucky, for the last two years, upon an average, would be about twelve thousand tons per annum."

The season has not been so favorable for the hemp crop of Missouri. Thus, we find scattered notices to this effect:

Pettis county, Missouri, July 9, 1844.—"The wet weather, which has set in, has not only prevented any shipping, but has ruined the growing crop. I have heard but one opinion expressed—that the hemp crop of Missouri is a total failure."

Again: the St. Louis Gazette says: "This important staple [hemp] of this section of the country, in consequence of the wet weather in the fore part of the season, will yield only about half a crop; the same cause produced a similar result last year, when the quantity was about 12,000 tons. This season there will be probably about 15,000 tons, which will be doubled next year if the season proves favorable."

The estimate above given, of 15,000 tons, is unquestionably an error: we suspect it is meant for 5,000 tons. A correspondent from this State says of the hemp crop, "that in some parts it was not one fourth of a crop, owing to the wet weather;" and again, not "more than one-fourth; including flax, it is probable there may have been 10,000 or 12,000 tons." The returns of the hemp and flax being mingled, and the amount of flax raised in Illinois being very considerable, it is difficult to form any suitable estimate as to the hemp crop of this State. In the northern central counties we are told, "the hemp crop was very indifferent"—"not more than one-third of a crop, owing to the bad season. There was a very great increase in the number of acres sown in hemp in Illinois during the past season. The attention of farmers is much turned to this branch of production, and there is a great prospect of a large increase in the article of hemp in Illinois hereafter."

From a correspondent in Kentucky we have the following statement respecting the hemp crop generally. It will be seen that it sets the hemp crop of that State higher than Judge Beatty has done, and we believe probably puts the crop of Illinois too low. His means of information, however, entitle his opinion to consideration. He says:

"There are probably not 100 tons of hemp produced in Virginia. It is grown to a limited extent in the counties of Virginia bordering on the Ohio river. The product in Kentucky is about 15,000 tons; of Missouri, 6,000 to 8,000 tons; Indiana and Illinois, 500 tons; Ohio, 500 to 1,000 tons. Little or none in any other State.. A great deal of flax in Kentucky, Indiana, and Ohio, chiefly for seed and home-made linen."

By the following extract from a public journal, we see that attention is turning to this crop somewhat in Mississippi:

"The Vicksburg Whig notices the fact that General John H. Robb had produced at the rate of 1,200 pounds of hemp per acre at Shirt-tail bend, on the Mississippi; and also the fact that Messrs. Warfield had raised and manufactured in Mississippi, in one year, enough hemp to bale one hundred and fifty bales of cotton."

A correspondent in Orange county, New York, says: "A portion of our county is admirably adapted to this crop, and it was formerly extensively cultivated; but, for some years past, its growth has been discontinued, for want of remunerating prices." In connexion with this crop, we have gathered some particulars which may deserve mention here.

The following statement of hemp received at New Orleans may help to show the rapid increase of the cultivation of this important article: "In 1841–'42, the entire receipts at New Orleans were only 1,211 bales; in 1842–'43, they rose to 15,000 bales; and in 1843–'44, they reached 38,000 bales, or about 5,000 tons—the increase being almost exclusively from Illinois and Missouri."

Again: "We notice 7 tons of water-rotted hemp, bought by Messrs. James Anderson & Co., of John Steele, Esq., of Fayette county, Kentucky, near Lexington, at $130 per ton. We have closely examined whole warehouses of Riga hemp in Boston, and we think we can say, with truth, that we never saw hemp superior to this lot in any respect. It is very heavy, of beautiful color, free from tow, and perfectly clean. It is fully equal to hemp for which our paternal Government pays Russia $235 a ton."—*Louisville Journal.*

It is also stated, in one of the public journals, that 800 bales of dew-rotted sold in New York (designed for the English market) at $100 per ton.

The better qualities are stated to have advanced $10 per ton, and the inferior $5. The Farmers' Visiter for July also says that "nearly 5,000 bales (or 123,500 pounds) of American hemp were received at Boston from New Orleans, during the six months ending on the 1st instant." A writer in the Dollar Farmer, published at Louisville, Kentucky, speaking of the encouragement respecting this crop, says: "From our own personal observation, and from the oft-tried experiment of a few pioneers in water-rotting hemp, we can safely say that the farmer will be able to realize, at the present low rate of hemp, from $6 50 to $7 per hundred weight, for fair, well-cleaned water hemp, without hackling from the hand beater; and for a very superior article, he may expect $8 or more. Fair dew-rotted rates something below these prices."

The great difficulty still experienced is a process of water-rotting and a brake—such as would enable the farmer properly to prepare for the market much of the hemp which is now converted into bagging, or wasted. Several notices have been published in the Western journals, announcing from time to time that the latter desideratum has been attained; but we have not seen any account of complete success having been reached. A writer on this subject says:

"The custom of dew-rotting hemp would, so soon as these experiments are brought to a successful issue, and this machine is put in operation, be abandoned; because a more valuable article could be prepared at a less expense. But, forsooth, some of our practical farmers may ask, what is to be done with so much hemp when it is raised? Let us see. Kentucky has raised, for the past two or three years, an average crop of 15,000 tons annually; the great bulk of which has been *dew-rotted;* and, with the exception of a few hundred tons for twine, bed cords, &c., all of this, owing to the mode of preparation, is fit only for bagging and rope.

"In the manufacture of these articles, there are about 10,000 tons annually consumed, leaving an over-production of 5,000 tons a year, which will have to lie in the farmers' hemp houses until the bagging manufacturers are ready to buy it. There is, however, a greater increase in the produc-

tion of hemp than there is in the manufacture of it; because bagging and rope are articles of limited demand, and their consumption depends exclusively upon the extent of the cotton crop. These circumstances combine directly to reduce the price of *dew-rotted* hemp; and, owing to the facts that the annual production of our State and Missouri is not only 50 per cent. more than the consumption, but also that an estimated surplus of from 5,000 to 8,000 tons of the crops of 1842–'43 is supposed to be at this time in the farmers' hands unsold, many persons are even now looking forward to the price of hemp ruling lower next year than it has ever done before. Supposing, on the other hand, instead of *dew-rotting*, the entire crop of Kentucky was *water-rotted;* what would be the condition of things then? Why, instead of keeping his crop until the bagging manufacturer was ready to buy it, the farmer, by drawing out some 25 per cent. of tow, could obtain for the clean hemp from $160 to $200 per ton, and *for the tow* he could get as much from the bagging manufacturer as he now gets for his best *dew-rotted hemp.* He then never need fear the markets being glutted; for the consumption of water rotted hemp in the world amounts to several hundred thousand tons annually. Russia alone raises 120,000 tons; and, as I have before said, Kentucky could be made to produce 100,000 tons, if our farmers only knew *how to prepare it properly*, and a machine was in successful operation to compete with the serf labor of Russia."

At a meeting of the American Institute, a communication was made by Mr. Knight, of Kentucky, respecting a new mode of rotting hemp, by water heated to 160 degrees of Fahrenheit, by which it forms an entirely new staple; it becomes silky, more delicate and beautiful than the first flax.. The same gentleman made the following statement to the institute: "Governor Chambers communicated to me a very curious important fact in relation to hemp. He stated that some years since a few tons of hemp were brought to his factory in Kentucky, which his foreman pronounced worthless, in consequence of its being over rotted—the fibre not having sufficient strength to bear twisting. It was, however, put away in one corner of the hemp house as tow, where it remained a year or more; when, being out of hemp, and wishing to keep the force employed, he directed the foreman to try the lot, and see if it could not be spun for bed cords; when it was found to be quite a good article, it having acquired tenacity by age. It was accordingly worked up, and he paid the farmer the usual price. Experiments were afterwards made on lots of similar character, and the results were equally favorable."

The above important facts show the benefit that may yet be derived to this country by the hemp crop. The amount of hemp imported in nine months in 1843 reached in value $228,882. By the following extract of a circular of a house in New Orleans, dated September 12, 1844, we see what may be done:

"*Hemp.*—This important article to the growers of the Western country is beginning to attract much attention, not only in this country, but in England. The consumption of it has greatly increased since the last year, which has been supplied by shipments from the West, a portion of which was placed upon the market at much less than its value, and in quantities sufficient to supply the immediate demand, at $75 and $85 per ton for American dew-rotted. All, or nearly all, thus held, has been taken; and prices have advanced to $92 50 *a* $95. Should the stock not be greatly increased, we expect to obtain $100; at which we are holding, and at which we have made some sales.

"Much attention should be paid to the preparation of hemp for the market; it should be entirely clear of shives; neatly and securely baled. The imports of Russia hemp this year are very small—only about 400 tons against 4,000 last year. This will cause an increased demand for your water-rotted hemp, which, if well cleaned, and of bright color, will be taken at full prices—say from $160 to $170 per ton."

Machinery of the most perfect kind is said to be in use in Europe, by which the finest linens (the superiority of which is seen by their being labelled "all hemp") are fabricated. Similar applications might be made in our own country.

We have thrown into our appendix No. 10 some extracts from the report of M. Butowsky, the agent of the Russian Government, who was sent over all Europe to inquire and report "as to the best means of improving the management, cultivation, and fabrication of hemp." A translation of this document was lately published by order of Congress; but the extracts in the appendix contain, in a short compass, some of the most important particulars, prepared by a correspondent of the Louisville Courier.

We have also thrown into the same appendix a circular published by some dealers in the article, which we take from the Prairie Farmer. From the Southern Planter, of August, we have also taken some extracts from a letter from William M. Peyton, of Virginia. Another from the Dollar Farmer, on the culture of hemp, &c. Should time allow, it is, too, our intention to add some extracts, in translation, from a German work, on the vegetables employed in spinning, &c.

The estimated hemp crop for 1844 is 22,800 tons.

Flax is raised in some parts of our country for seed, and the amount raised for this purpose is increasing. We have rich lands, and can raise this crop to great advantage. There is little danger of overstocking the market with seed, as the demand for the oil thus made is great. The oil crop, in most cases, will pay for the expressing of it. The quantity of oil is said to be about two gallons to the bushel; the yield per acre of seed is from 8 to 15 bushels. Sometimes in Europe it is sown and mowed when the seed is ripe, and the stalk thrown away. But since the new discoveries which have been made for enabling the manufacturer to spin it, and fabricate fine linen from it, by machinery, it must reduce the price of linen fabrics, and enter into competition with cotton goods. Flax is admirably adapted to the first cropping of prairie land—the sod being turned over flat, no weeds appear the first season. In this way, flax for seed may be obtained; and American seed for sowing commands a high price in England, where flax is often pulled before it is ripe, and where the climate is not so favorable for ripening the seed. The amount of flaxseed, as well as of linen goods, &c., imported, is of considerable value, though we cannot give any definite returns in respect to them. The paper in appendix No. 11, on the subject of flax, has been furnished by an experienced manufacturer of flax in Paterson, N. J., and contains much valuable information, gathered from his personal observation abroad. By the following extract from a public journal, it appears that the business of raising the seed is one of no little importance at the West:

"*Flaxseed.*—The Cincinnati Atlas states that the cultivation of flax for the seed alone has become an important item among the farmers of Hamilton county—one farmer having 20, and another 30 acres under culture. The establishment of oil mills in our Western cities makes a home market, at a price that pays well for the cultivation even of the seed alone."

The Genesee Farmer, of September, 1844, speaking of this subject, remarks, that seed will bring in that vicinity $1 50 a bushel, in any quantity, both for home consumption and export. It is also stated that the price of flax is about $150 per ton.

In a Western journal, foreign flax is said to be held in Great Britain at £42 to £100 per ton. Irish flax at £1 15*s.* to £1 18*s.* per cwt.; and milled flax at £2 12*s.* to £2 15*s.* per cwt.

TOBACCO.

The tobacco crop is confined, in a great degree, to particular States; and so much difficulty is experienced in forming any estimate with respect to those States where a few thousand pounds or less are raised, as exhibited on the basis of the census returns, that we have thought it best to strike this crop from the column, as regards those States. In Connecticut and Massachusetts only, of New England, have we retained any estimate, where we believe there has been some increase. In the latter of these States, the attention devoted to the culture of tobacco is principally confined to a few miles around Connecticut river and its vicinity, in the northern part of the State, where, on account of the profit derived, more land has been devoted to it, with successful returns, from year to year. It is stated that in 1843, in the single town of East Windsor, "more than 500 tons were produced, which sold for over $50 per ton; thus bringing in more than $25,000. In five or six adjoining towns, there is also a great deal of tobacco raised. Within the circumference of 25 miles, there is probably not less than 2,500 tons sold annually; and the tobacco is good—better for cigar wrappers than that of the South." This would seem to indicate that our former estimates for this State have been probably about right. We believe this is the fact; and we have therefore fixed it at an increase of 10 per cent. for the year 1844. Respecting this crop in Pennsylvania, we have been unable to ascertain it satisfactorily. From the little incidental knowledge we can get, as it is said to have done well, and more to be planted, we have concluded to fix it at a slight increase, though we should not be greatly disappointed if it turned out otherwise.

Maryland is a large tobacco-growing State. There is considerable conflicting in the accounts of this crop gathered from the public journals. Thus, for instance, it is stated:

"*Maryland tobacco.*—Lyford's Journal of Saturday says, in reference to the coming crop of Maryland tobacco, that all accounts agree in pronouncing it, from present appearances, the largest, and of as good quality in general, as the State has ever produced. Some portion of it is already housed."

"*The tobacco crop.*—A tobacco planter of Anne Arundel county, Maryland, states that the article which we copied from Lyford's Journal on Monday last, relative to the extent and quality of this year's Maryland tobacco crop, is incorrect. In Anne Arundel, Prince George, and Calvert, the principal tobacco-growing counties in the State, he says the planters will be satisfied in having two-thirds of an average crop. This may be so, but Mr. Lyford is usually correct in his statements."

So, too—

"*Injury to the tobacco crop.*—The Marlborough Gazette of Thursday last says: Much injury was sustained in the lower part of Prince George by the storm on yesterday week. We learn that several planters had their tobacco crops so much cut by the hail as to render them valueless."

And again:

"We would remark, in reference to the present tobacco crop in Maryland, that, from all the information we can get, (and we have taken a good deal of pains to obtain it,) the crop of Maryland is about one-third short of an average one. At the same time, we understand that the quality is much superior to what it was last year, being rather thicker in the leaf, and generally very bright in color. The planters will therefore, in all probability, realize as much in funds for their crop this year as last, as the improvement in quality will make up for the deficiency in quantity."

In July, we find the following notice from Rockville, Montgomery county: "The tobacco planters here made great preparations for the cultivation of a larger crop than has been grown for a number of years; and the season, so far, has been favorable." In the southeast section of the State, bordering on the Potomac river, the report respecting the crop is "50 per cent. short, on account of a dry May and a very dry summer." We believe that the crop is full 25 per cent. short, on an average, of the usual fair crop of the State.

The Virginia crop, to judge from the notices which are found in the journals of that State, has greatly suffered during the past year. The following are specimens:

The Norfolk Beacon says: "In the great tobacco region of the Roanoke, in Prince Edward, Charlotte, Halifax, Pittsylvania, and in the upper James, a drought, more severe than has been felt for many years, has materially impaired the prospects of the tobacco planter. In the above-named region and country, the injury to the corn crop is estimated at one-half to two-thirds. The condition of the tobacco crop is exceedingly critical. The portion of the crop first planted has grown spindling, for want of moisture; while that planted later has put forth very closely, or perished in the hill. As late as the 2d, no rain had fallen in the country above named for months, and the injury sustained by tobacco must be material.

"The degree cannot be fully ascertained, but the crop must be short. Indeed, we fear another disastrous year for our great staple is about to revolve—a result which cannot be deprecated too earnestly by all interested in the prosperity of Virginia. The two last crops of tobacco have not only not added a dollar to the prosperity of the State, but left every planter involved in debt. The loss sustained by the planting interest has been almost overwhelming. Hundreds of slaves have been sold out of the State; not far from seventy-five to one hundred have been removed beyond our limits within the last twelve months, and a very heavy balance is yet marked down against the planter. It is difficult to estimate the bad results of a failure of the present tobacco crop; but, as circumstances now are, it is well to prepare ourselves for the worst, and make the best of it."

Again: "*Tobacco crop.*—A friend from Charlotte county, in this State, informs us that an unusually severe drought has prevailed in Charlotte, Halifax, Prince Edward, Cumberland, and in the counties adjoining these; and great fears are entertained for the corn and tobacco crops. No rain has fallen for several months, and up to Saturday last the drought still continued. The corn crop must be curtailed a half, if not more; and the fate of the tobacco crop is very doubtful. In large districts of country the plants failed, or were destroyed by the fly, and the beds were new sown. This produced a late planting of the crop, and the want of rain has increased the difficulty. Many plants have died in the hill, and few planters have a full crop standing. The drought has also injured the tobacco that was planted

early, causing it to grow light. The tobacco crops of the three past years have wrought such disaster to the planters and to the Commonwealth, that we will not permit ourselves to believe that another is to be added to the disheartening results of the past."—*Norfolk Herald, August* 9, 1844.

Elsewhere we are told, in September: "The prospect for a good crop of tobacco is very gloomy. The tobacco crop is very unpromising, the drought is so severe."

Similar to these are notices which have been furnished since the first crop was gathered. Thus, in the southeastern central section of the State, in the vicinity of Amelia county, it is stated that there was "a falling off of 30 per cent. from the previous crop, though that which was raised is of superior quality." This was the "result there of drought." In the southern central counties, bordering on North Carolina, it is said: "The last was a small and bad crop; and this is somewhat less—caused by a scarcity of plants, and a dry July, August, and September; but that portion of this year's crop which was planted early (say one fourth) is of a very superior quality." North of this, "the quality was good, but the quantity was hardly an average." In the western part of the State, also, the crop was about an average one. Considering that the last year's crop (1843) was so poor, though this of 1844 has been lessened, yet, on the whole, we think it has not decreased more than about 20 per cent.

In North Carolina, the same cause has operated to reduce the crop. In some sections the crop is rated at about one-half, as but little was planted. Elsewhere it is said that "in quantity it was about equal to last year, but the quality was superior." On the whole, the average decrease from the crop of 1843 was doubtless equal to 15 per cent.

Respecting the crop in South Carolina, we have so little information that we find it difficult to form an estimate. Bordering as it does on North Carolina and Georgia, the season was similar; but, as the crop occupies a minor place in the production of this State, we allow but little increase—perhaps 5 per cent.

In Georgia, the tobacco crops in the western section, or what is called the Cherokee country, are said "not only to be much better, from the favorableness of the season, but there has been an increased culture." In one part of this region, the increase is estimated at 150 per cent., on account of the very low price of cotton. Take the State through, we believe that there was probably from 25 to 30 per cent. advance on the crop of 1843.

The same, we believe, was the case with Alabama, Mississippi, and Florida; although, from the little attention given to it, notices are unfrequent in the all-absorbing question of the prosperity of the cotton crop. The crop of tobacco in Tennessee is quite large; and in West Tennessee, we see it stated that it was "very promising." The whole crop of this State appears to have been an increased one—perhaps 10 to 15 per cent. The same was probably the case with the crop in Kentucky, where there was an increase of from 5 to 10 per cent. It is said that, from all accounts, the presumption is, that the crop in Ohio is nearly or quite an average one, and the quality about as in the previous year. In the Miami valley, one informant says: "In 1843 there were 12,000 pounds raised; in 1844, 8,000. The crop of this year was superior to the last in every respect, and the decrease of quantity is the result of a less number of acres being cultivated. In yet another section of the State, the quantity is fully double. Probably there was an advance of from 10 to 15 per cent.—possibly more.

The early notices of the crop in Missouri which meet us are like the following:

"*The tobacco crop in Missouri.*—A gentleman familiar with the subject has recently been travelling up the Missouri river. He informs us that he saw and conversed with a number of planters, and had means of gaining correct intelligence of the prospect of the coming crop in the counties of Boone, Howard, Chariton, Randolph, Macon, Calloway, Montgomery, Warren, and St. Charles. In these counties our informant states that the crop will nearly equal in quantity, and greatly excel in quality, that of any former year. Our informant states, that since his return he has had opportunities of conversing with planters, and received accounts from most of the other tobacco-growing counties, all of which concur in the above statement. It is now pretty certain that the quantity in the State will about equal, (probably from the increase of growers,) if not exceed, that of any former year, and be of fair complexion, and better adapted to manufacturing than any previous crop."—*St. Louis Republican.*

The information obtained since the crop was gathered hardly corresponds with the above. For instance, in sections of the State we are told that "the crop was but about one-half a crop, on account of the overflow;" and, again, "two thirds of a crop." We believe, from all we can ascertain, that there was a falling off of from 20 to 25 per cent.;" but that, allowing for the increased culture, on account of new lands, &c., we may estimate it at about 15 per cent.

The following is the statement in the St. Louis Gazette, which, at 5,000 hogsheads for one third of the crop, is near our estimate:

"*Tobacco.*—The crop sent to this market falls short of last year, when there were about 7,000 hogsheads. This year the number will not much exceed 5,000 hogsheads, and the quality is not generally so good. It has been cut too green, and is specifically lighter than that of a more mature growth. Prices vary from $1 to $11 per hundred. The crop throughout the State for 1844 will probably amount to 20,000 hogsheads. Only about one-third of the entire crop comes to this market. About two-thirds is shipped direct to New Orleans, from the different harbors along the river."

Tobacco is raised in some of the other States; but the quantity is comparatively small, and attracts so little attention, that no very definite calculations can be given respecting the crop in them. We have fixed the estimates in the table, according to the best judgment, from a comparison of former productive seasons, contiguity, &c.

The whole tobacco crop of the United States for 1844 we suppose may be fixed at 166,705,000 pounds.

In a Richmond paper we find the following statement respecting the crops of Virginia and North Carolina, under date of October 3: "The total inspections embraced in the statement to the 30th of September, is 10,861 hogsheads less than at a corresponding period in 1843; but still the returns do not accurately exhibit the real deficiency between the productions of 1842 and 1843, in consequence of a larger quantity of tobacco being reprised and inspected a second time; the present year, perhaps 1,500 hogsheads were, at least, thus counted twice in the inspections. At this time the stock of old tobacco held by the planters is very small. Relative, therefore, to the crop for inspection in 1845, it must be mainly confined to the production of 1844, which, in the aggregate, will not exceed 40,000 to 45,000 hogsheads. The home demand for tobacco is regularly increasing."

Statistics of inspections and stock, to 30th September, 1844.

	Inspected.		Stock.	
Richmond	19,147	hhds.	8,446	hhds.
Petersburg	10,812	"	714	"
Farmville	2,714	"	380	"
Clarksville	1,954	"	24	"
Lynchburg	10,209	"	4,674	"
Tye river	475	"	50	"
Milton and Henderson, North Carolina	575	"	75	"
Not official—conjectured	45,885	"	14,363	"

The kinds inspected during the year 1844 at Baltimore, it is said, were—

Maryland	32,101	hhds.
Ohio	15,423	"
Kentucky	1,075	"
Virginia	225	"
Missouri	40	"
Indiana	30	"
Tennessee	21	"
Pennsylvania	17	"
Total	48,932	"

In a Virginia paper, we find the following remarks with reference to the amount of production, and the effect of a failure in the crop, which we subjoin, as furnishing some facts which may be useful to record:

"From the year 1800 to the year 1839, the whole quantity of tobacco exported from the United States, annually, amounted to about 82,000 hogsheads. During this period, one or two short crops in Virginia would affect prices. The Western States, during this period, had never exported, on an average, more than 35,000 hogsheads. In 1840, the West exported 40,000; in 1841, 54,600 hogsheads; in 1842, 68,000 hogsheads; in 1843, 89,800 hogsheads; and in 1844, 81,200 hogsheads. We refer you to the New Orleans price current of the 7th of September, for the exports of tobacco from 1835 to 1844, inclusive; by which you will see that New Orleans alone has exported, in the last two years, as much tobacco, on an average, as the average products of the United States previous to 1835. This, we think, is sufficient to account for the low prices of 1843 and 1844; and we may say, the very inferior quality of the Virginia tobacco for two years past has contributed not a little to lessen its value, and to bring the Western tobacco into more general use. The fact is, that the West produces now nearly as much as the consumption of Europe demands. The failure of a crop in Virginia has very little, if any, effect on prices in Europe. It does, however, affect prices at home in our own market, since our manufacturers require annually from 18,000 to 20,000 hogsheads of Virginia tobacco for the consumption of the country, which is about half of what is supposed to be the crop of Virginia grown this year; and the consumption being on the increase, it is fair to suppose that at least one-half of the tobacco raised in Virginia hereafter will be manufactured for home use. It should be remembered that the growth of tobacco is not

confined to the United States. It is supposed that at least as much as 75,000 hogsheads are raised in other countries. It is true the consumption is on the increase; but it seems that the production is far ahead of the consumption, as will appear from the statement of exports and products."

In letters which have been received from Algiers, (as we learn from the foreign journals,) it is stated that the French have been successful in their plantations of tobacco formed there; so that it is not improbable that, in the course of some years, they may derive a portion of their supply for the market from that colony. The opinion is expressed that China may open to us a considerable sale, as the milder kinds, cut fine, and sent in packages of 5, 10, or 20 pounds, would be quite profitable there. They are said to use an immense quantity of their own raising, but it is far inferior in quality to the American. That which is taken out from this country by the captains and mates of ships is said to find a ready sale. As ships from every quarter of the globe visit that part, and not much is exposed for sale, the opinion seems probable that there would be a very considerable traffic, were it attempted, as might now be through the ports opened to us. Several valuable papers on the culture of tobacco have been published by Dr. Gardner, who enters very fully into the question as to the conditions of the soil, the preparation necessary, &c. He states that "in rich loams, where the solution of the minerals of the soil is rapid, and where 10 to 20 per cent. of vegetable matter is incorporated in the earth, tobacco may be obtained for many years; but it is always an exhausting crop." He adds: "It has been stated that 170 pounds of mineral matter are removed in less than three months, by a crop of tobacco, from one acre of land." "This is very much more than wheat or other grains carry off in eight or nine months. Thus, wheat planted in October, and cut in June, takes from the soil, of the same mineral substances, 22 pounds in a crop of 20 bushels, with straw. In these estimates, the sand or silica is omitted, inasmuch as its supply is too great in all soils to cause any fear from exhaustion."

"The important mineral substances presented in Havana tobacco, examined by Hertwig, (Liebig's Annalen for April, 1843,) are:

Salts of potash, 34.15,	Salts of lime, 51.38,
Magnesia, 4.09,	Phosphates 9.04,

in one hundred parts ashes.

"These substances were, for the most part, insoluble in earth, and must have been dissolved during the growth of the crop.

"We have now arrived at a clear view of the cause of sterility in lands as respects tobacco—saline substances and ammonia are not rendered fit for food with sufficient rapidity. We also see why a large amount of dead leaves, or other vegetable rubbish, will yield a crop, by giving up to the roots a sufficient quantity of these bodies.

"The great question is—whether there are economical means by which land, which has lost the power of sustaining tobacco, can be rendered fertile, and be maintained in that condition."

He recommends the attaining a suitable soil by providing means to promote its *porosity*, and then to *hasten the solubility of its saline matters*. This (he says) may be done by liming; by burning part of the surface soil with lime in the kiln; by incorporating vegetable matter in the soil; by burning of clay, and pulverizing; also, to secure the ammonia of the soil. On these subjects, he makes many remarks. The whole essays deserve the careful perusal of the tobacco planter, as they contain numerous

valuable suggestions. They have been published by most of the agricultural journals in the tobacco-growing regions.

In a late number of the Southern Planter, a new remedy is described to prevent the destruction of tobacco plants by the fly. The writer says: "I had a bushel or two of dry ashes put into a large tub, and added train oil enough (say one gallon of oil to the bushel of ashes) to dampen and flavor the ashes completely; this was well stirred, and mixed with the hand, and sowed broadcast over certain patches, Nos. 2 and 3." The trial was successful, as it likewise was another year; while on No. 1, another left without the remedy, the plants were destroyed. In consequence of the expectation that a duty amounting to a prohibition would be imposed in England on tobacco strips, it is mentioned in a public journal that the stemmeries of this country had been closed, and no tobacco would go forward in the shape of strips. England was the only foreign market, before, in which strips were taken.

COTTON.

There can be no doubt that, with regard to this great crop, which exercises so mighty an influence on the trade of this country, the crop of 1844 is much larger than that of 1843. Indeed, had it not been for the floods of the Mississippi, it would have been probably as large, if not larger, than any before raised in this country. The return of the crop of the previous year, as it appears, was about 2,000,000 of bales, which, at 375 pounds to the bale, is only about 3,000,000 of pounds from the tabular estimate of 1843. It is possible that, in the proportional distribution of the crop, there was less accuracy. We see it strongly insisted upon by some of our correspondents, that Mississippi is now the foremost State in the production of cotton; and we are inclined to think that this may be true, as the progress of the culture is gradually more and more westward, though we felt justified in reducing the crop of that year, and raising that of Georgia in 1843, by the accounts which we could gather from the various States.

In Virginia, there was probably a falling off of cotton, from the drought: the decrease is, in some sections, even as high as 30 per cent.; but it was of superior quality.

The cotton crop of North Carolina is thus noticed at an early date in one of the public journals: "The prospect of a good cotton crop in the northern part of the State is somewhat doubtful, owing to the drought. Some fields are much injured." In the northeastern section of the State, however, subsequent intelligent information is given: "The cotton is better than I have known it for many years; but, in consequence of the low prices at which it had been selling, planters did not try to raise it extensively this year, but curtailed their crops. In the northwest counties, the crop was an average one, yet little was planted." In the southwest, it was "good, clean, and dry, and opened well." In the southern central section, bordering South Carolina, it is thought to have been "one fourth less, on account of the drought." On the whole, the crop for the State may have been a slight increase of from 5 to 10 per cent. over the crop of 1843, which fell off considerably from the previous year.

The following are some of the notices which have been gathered, from time to time, from the public journals, to mark the progress of the cotton crop in South Carolina.

From the Charleston Courier, of June 20, in regard to the crops, we quote the following extract of a letter, dated Jeffries Creek, June 10: "I have melancholy news to write in relation to the cotton crops in this neighborhood, and, I may say, so far as I have heard, in this region of country. About a fortnight or three weeks since, our prospects were never more flattering; but, in this short time, the *aphis gosypii*, or cotton louse, has attacked our cotton in such numbers, that, without some speedy arrest of their ravages should take place, there is a strong probability, from present appearances, that many crops in this neighborhood will be entirely destroyed; and none that I have heard from will escape extensive injury. I have ploughed up one-fourth of my own crop, and planted it in corn; and in the balance of my farm, there can scarcely be found a stalk of cotton but what is stocked with the insects. I have heard from most parts of this district, and from a portion of Darlington, and complaints from this insect are almost universally heard of."

"*The weather and the crops.*—This present month of July will be noted for intense heat and protracted drought. The surrounding country has suffered incalculably for want of rain. The corn crop is materially affected; and even cotton, which, up to within a few days, promised a most abundant yield, has commenced shedding its bolls to a most incalculable extent."—*Cheraw* (*S. C.*) *Gazette of July* 30.

A letter in the Charleston Mercury gives a melancholy picture of the cotton crop, which account is confirmed from other sources of information. The Mercury says: "This disastrous result of a season that promised, in the other part, more richly than any for some years past, is not confined to that State, but is true, with more or less of mitigation, of the entire cotton-growing region. The peculiarity of the growth is, that the plant attained a precocious maturity, and that all growth, and consequently all possible increase of the product, is now at an end. The crop is now nearly all gathered, or ready for gathering. Frost may come early or late; it is all the same. There will be nothing for it to kill. Favorable localities may, to a limited extent, have escaped this injury; but, beyond a doubt, the disaster has been general. The Sea Island crop is believed to be much better in the upland, as one might expect."

The Anderson (S. C.) Gazette says: "We have no rain yet. The cotton crop has been cut off nearly one-half."

"*Edisto Island, August* 5.—Though for some weeks past our dry and parched fields have been entreating in their behalf the prayers of the faithful, never, till ten days ago, had I seen a better promise of cotton to our painstaking planters.

"The effects of the long-continued drought, however, have at last become alarmingly apparent, and our fields now present an aspect of premature age. The stalks are red—an indication of maturity; and the leaves on some plantations, withering and dying, cover the earth as after a frost. In the low lands, where, from some remains of moisture, the plant has been enabled to endure the fiery trial, a red bug, unknown except to our oldest men, has appeared in great abundance, and is now sucking up its vital energies, and doing even more damage (some say) than the caterpillar of known destructiveness."

The view taken by other informants, respecting the crop in this State, corresponds mainly with the above. It seems to have been better, however, in the northwestern section of the State, as the crop was about the

same as last year. In forming an estimate, however, it should be remembered that the crop of 1843 suffered a great decrease from that of 1842. Further towards the east, along the northern line, it was stated that it was short--say about three-fourths: the late fall was favorable, or it would not have been more than half a crop. Probably there was a decrease from the crop of 1843 of about 15 per cent., as that was by no means an average crop.

Georgia ranks among the foremost of the cotton-growing States. There is some diversity among the earlier notices of the crop, as probably the state of the market might have some influence upon the tone of the journals. In June, we find the following:

"*Hailstorms.*—The Columbus (Georgia) Times, of the 5th instant, has the following: A heavy storm of rain and hail passed over the Chattahoochie river, some three miles below this city, on Thursday last. We hear that the corn and cotton were terribly cut up on those plantations within the track of the storm. A river planter showed us half a dozen cornstalks taken from a field of 150 acres, and which he said was a fair specimen of the damage throughout the field. They were stripped of every leaf, and rudely topped. These storms have been general. We encountered no less than three on different days of last week, on a journey from the Ocmulgee river to Columbus, through the counties of Houston, Macon, and Marion. We did not learn that the damage was very great."

Other accounts are in July. The Albany (Georgia) Courier, of the 31st ultimo, says: "For the last few days we have been apparently in the midst of autumn. The nights and mornings have been so very cool as to render fire necessary for comfort. The weather has been dry for more than a week past, and altogether favorable to cotton."

"*New cotton.*—The Augusta Chronicle and Sentinel, of Wednesday, announces a bale of new cotton in that city from the plantation of James Gardner, jr., Esq., of Columbia county. It is of good staple and fine quality. The first bale of new cotton received last summer was on the 24th day of August—25 days later."

Extract of a letter dated Columbus, Georgia, September 3, 1844: "The weather now is, and has been for some time past, particularly favorable to the growing and maturing cotton, and the picking is now in full blast. Such weather will insure a large crop."

"*New Sea Island cotton.*—A bale of Sea Island of the new crop was received yesterday from the plantation of Mr. Angus Martin, of Liberty county, consigned to Noble A. Hardee. This is early for this description of cotton—much earlier than former seasons."—*Savannah Georgian, August* 31.

"*Sea Island cotton.*—We have received a specimen of Sea Island cotton from the plantation of Colonel W. W. Hazard, of St. Simon's. It is from the big cream seed, of very fine quality, and extra long staple. Colonel H. writes us, that in July he picked at the rate of 8 pounds to the hand per day, which has not been done before, he thinks, for many years.

"The Sea Island crop still promises very fairly, and our planters on the coast will, we hope, reap a rich harvest for their toil.

"Another specimen, of similar quality, has been kindly furnished us by Dr. Hazzard, also of St. Simon's, and to which all we have said of the above is strictly applicable.

"The cotton crop in Houston county, where I reside, was very likely

until the last of August. Heavy rains, and some remarkably cold days and nights, with a heavy wind, have altered the appearance very materially; and I venture the assertion, that the present crop will fall short, in this county, of the crop of last year, from one-third to one-fourth. D. B.

"HOUSTON COUNTY, GEORGIA, *October*, 1844."

"*New cotton.*—Eighty bales of new cotton were received by the railroad last evening, consigned to various persons. The weather has been very fine for picking during the past two weeks. The accounts, though generally favorable, are somewhat contradictory as to the prospect of a large yield—many planters complaining of too much rain, and others of the ravages of the caterpillar."—*Savannah Republican, Wednesday.*

"*The cotton crop.*—The Washington (Georgia) News and Planters' Gazette, of the 5th instant, says: 'The prospects for a large crop, which were very fair some weeks since, are destroyed by the long-continued drought. There has been no rain of consequence for the last six weeks; and the consequence is, that the growth and production of the plant has entirely stopped. Some planters tell us that their crops will not be more than half what they had reason to expect a short time ago. What there is, however, is said to be of excellent color and quality."

In the western and northwestern part of the State, the crop is said to have been much better, and there was also an increased cultivation of the product. In some cases, it is estimated as "three times as large, on account of the low price of pork and corn, or the *no* price of every other agricultural product." Again, it is stated that it "turned out perhaps 800 or 1,000 pounds to the acre." The season in that section also seems to have been favorable.

On the whole, we think that, take the State through, there was an increase of 10 to 15 per cent. on the crop of 1843.

Alabama is likewise a large producer of cotton, and the following is the aspect of the progress of the crop in this State, so far as we have been able to gather it from the public journals. Thus:

"*The crop.*—The Mobile Merchants and Planters' Prices Current, of the 20th instant, says: 'From all parts of the cotton region we continue to receive accounts of the most favorable character in regard to the growing crop. Throughout Middle and South Alabama, the prospects for an abundant yield were never more promising;' and from the fact that the present season is at least three weeks in advance of the last, we have thus some data deemed reliable by many who have paid attention to the subject, upon which to found an estimate of a large crop for Mobile, as well as for the country.

"We were informed last evening, by a gentleman from Washington county, that the day previous he rode over several of the largest plantations in that county; and, from his observation, he is decidedly of the opinion that the crop does not look as well as last season. He says it is very true that much of the cotton is full three weeks more forward than last year: but so much has been injured by the rain, that it does not average as well as it did last year."

"*The crops in Lowndes county.*—We have seen a letter from one of our merchants, now in the interior, to his correspondent in this city, dated Lowndes county, August 14th, in which the writer says: 'The *worm* is destroying the cotton crop of this county.'"—*Mobile Advertiser.*

"During the week, we have had accounts from most of the cotton re-

gion in South Alabama and part of Mississippi. The prospects of the planter for an abundant crop are still highly flattering. It was apprehended that too much rain had fallen in some sections, but as yet we have heard of no serious injury from that cause. From Clark county, we learn that the caterpillar has made its appearance on some plantations, and fears are expressed that it may prove destructive."

"*The crops in North Alabama.*—The Southern Advocate, of the 6th instant, printed at Huntsville, Alabama, says: 'The weather, for some time past, has been alternately very hot and cool, and remarkably dry and dusty. Every thing is nearly parched up with drought. Our farming friends complain much of the injury done to the cotton crop by worms and the dry weather. The complaint is a general one; and it appears to be the opinion that the crop is cut off at least as much as one-fourth, if not one-third. The season for picking is quite fine, and the article must be very good.'"

"*Alabama cotton crop.*—The Mobile Herald states, that from the interior of the State, the news is, that the cotton crop was never as it is now. It was vigorous and abundant beyond example, and growing strong enough to defy all its enemies, the worms."

A correspondent of the Mobile Advertiser, under date of July 25, says: "The prospect of a large cotton crop in this part of the State has been blighted by the appearance of the caterpillar—the most destructive insect to the cotton plant known to the planter. Their appearance this season is much earlier than ever known any previous year."

"*Gosport, Alabama, August* 28, 1844.—The caterpillar is committing great destruction on our cotton crops on the Alabama river, in this section. I think our crops will be cut short considerable. The late excessive rains have rotted our cotton badly. Our crops are very fine."

"*New cotton.*—The Marengo (Alabama) Patriot, of the 31st August, says: 'Nearly 400 bales of cotton, of the new crop, have been received.'"

"We understand (says the Eutaw Whig) that good pickers, on some plantations in this community, were gathering, each, 300 pounds per day."

Under date of August 25, Colonel Alexander McDonald thus writes to the Cultivator: "I set out, on the 24th of June, from Eufalla, Barbour county, Alabama, in latitude 31½, being what may be termed the cotton-growing region. I have travelled over ten counties in Alabama, and saw many fine crops of cotton. It was, however, too early to determine as to the extent of the cotton crop. Dr. Cloud, of Macon county, in a letter of September 30, to the editor of the Cultivator, says that 'the cotton crop is good, notwithstanding the drought in the early summer. The worm and rust have produced considerable damage on the prairie lands, which has not been the case, except to a limited extent, on the sandy lands.'"

The following notice is taken from the Southern Cultivator, an agricultural journal in Georgia:

"*Crop of cotton in South Alabama.*—Mr. Editor: The past season has been favorable for our cotton and provision crops. Our prospects of an abundant production were never more flattering than they were during the last summer, until the appearance of the caterpillar in August. In many fields, on the Alabama river, below Claiborne, they were very destructive—having appeared before any part of the crop had matured; and although their progress for a time was very slow, they eventually passed through entire fields, leaving scarcely any trace of vegetation. Fortunately, this was not the case generally. There were instances of contigu-

ous plantations, on some of which their ravages were thus marked, and on others very little injury was inflicted by them. Until within a few days past, the weather had been particularly favorable for picking. For the last five days it has rained without intermission; and there is, of course, an entire suspension of field work. The loss which must result from this change of the weather, it is apprehended, will be great on the river plantations, as there is yet a considerable portion of the crop not yet gathered. An inundation of the fields, which we have every reason to anticipate, will destroy all that has not already been secured; and the hopes of the planters, whose crops were not early matured, or who have delayed their picking from other causes, may be thus frustrated. From the combination of various causes, the production of the crop will not exceed an average of the last four years; and, with the present prices, how small will be the profit of the year's labor!

"CLAIBORNE, *November* 25, 1844."

In the northeastern portion of the State, the crop is said to have been a good one—full an average crop. An informant, speaking of Gwinnett county, says that the culture of it was entered into pretty largely in the spring, on account of the rise of price. He estimates the amount in Gwinnett county at 860,000 pounds, or 2,000 bales. As the crop of last year fell off—comparing it with that crop, we believe the crop of 1844 was at least from 20 to 25 per cent. better, especially as there was, no doubt, much more under cultivation.

The early notices respecting the cotton crops of Louisiana are quite conflicting. We shall give some which we have gathered at different periods. The great flood of the Mississippi unquestionably lessened the crop very considerably; and we doubt not that the estimates given below on this subject will, in the main, be found correct; though it may be that some supposed to be lost, on account of the favorable weather which succeeded was not entirely so. We subjoin the extracts without further comment:

From the Concordia (Louisiana) Intelligencer, July 13.

"The extent of country overflowed the present season, though far less than was covered in 1823, contains within its limits property to an amount exceeding 2,000 per cent. what was then exposed and subjected to injury; and we hazard nothing in asserting that the amount of loss by the present flood will even far exceed that wide proportion.

"So far as we have been able to learn, up to the present moment, nearly the entire surface of the two Arkansas counties have been flooded; all the back and interior lands of Carroll parish—say over one-half the entire surface; near one-half of Madison; near one-half of Tensas; one-third the eastern front of Catahoula and Franklin, taken collectively—mostly in Franklin. Of the interior crop of Concordia, we cannot as yet offer a probable estimate; several places making three or four hundred bales are half flooded, and the water gaining on them rapidly, as it must continue to do, until a positive (and not reported) fall takes place as low down on the Mississippi as Natchez.

	Bales.
The actual loss up to the present date, on Roundaway, Vidall, Alligator, and Mill bayous, is - - - - -	3,500
On a front of forty miles in Bolivar county, Mississippi, near -	20,000
On Choctaw bayou, parish of Tensas, over - - -	2,000

	Bales.
On Lake St. Joseph's and Lake Bruin, parish of Tensas, and vicinity of Hard Times landing - - - -	3,000
In the parish of Concordia, about - - - -	5,500
On ten miles of southern front of Chicot county, Arkansas -	7,000

"This is but a partial estimate, but shows the damage and loss in the particular vicinities named.

"The direct loss is immense; but, as yet, no probable estimate of the entire amount can be given. We have made arrangements for collecting the details from the mouth of Arkansas to the mouth of Red river.

"Estimates of the loss of cotton by the floods on Red river, Arkansas, and the Mississippi, we heard made in New Orleans last week, as varying from one to four hundred thousand bales. The result, we anticipate, will be in the vicinity of the latter, but the facts shall be supplied as early as practicable."

"*Shreveport*, (*Red river*,) *June* 22.—The crops in this parish and De Soto never looked more promising than they do at present. Copious and invigorating showers have fallen at desirable intervals for several weeks past.

"The crops above the raft are, by the combined ravages of the high water and the worm, seriously injured, and, in some instances, entirely destroyed. The latter has attacked the crops in the uplands as well as the bottoms.

"The last intelligence from the raft indicates rapid progress in the removal of that obstruction."

"Since my former letter in relation to the loss sustained by the cotton crop on account of the floods, I have seen some planters who have come direct from the Red river. They say they estimate the loss on that river and tributaries alone, at about 130,000 bales. This may appear too large an amount. Be this as it may, I still adhere to my former opinion, at which I arrived after much personal observation and careful inquiry—that, under no circumstances, will the loss fall short of 200,000 bales. It is possible it may exceed this amount. Some say it will reach 250,000. That portion of the crop destroyed embraces the finest qualities of short staple cotton made in America; such as that grown on the bottoms of the Red and Mississippi rivers, and on lands bordering lakes and bayous in Louisiana and Mississippi. The effect of this loss may not be very material upon the average market value of the aggregate crop; but I have no question of its future influence upon the higher qualities of the article, which will be more scarce. This circumstance will also, very likely, give greater firmness to the lower classifications, or to the inferior grades."

From the Caddo Gazette.

"*Crops in western Louisiana.*—Extract of a letter dated De Soto parish, Louisiana, July 26, 1844: Never were crops more promising in this and the adjoining parishes. Corn is so very abundant that, like last season, it may be bought at 12½ to 15 cents per bushel; and should occasional showers continue, and no casualty happen to the cotton crop, it will yield a bale to the acre in our parish. The 200,000 bales represented to be lost by floods on the bottom land will be amply replaced, I judge, by augmented crops in the uplands.

"The loss by the overflow in the cotton crop has been variously estimated—some as high as 400,000 bales—which I think must be exaggerated; and of course the very nature of the case prevents any thing like a correct estimate; but all agree that the growth is most luxuriant and promising where the flood has not reached, and that plantations where one-half of the crop has been destroyed will still gather as much as they did last season. But for the injury that has been sustained, the crop would no doubt have been the largest ever grown in the United States, and, as it is, will probably equal any preceding one."

"*New Orleans, July* 29.—The steamboat Brilliant brought down yesterday the first bale of new cotton, from the plantation of A. Doherty, Esq., West Feliciana, consigned to J. B. Byrne & Co. The crop is about a month earlier than last year, when the first bale was received on the 17th day of August.

"Since writing the above, three more bales have been received by the Bunker Hill, from Vicksburg—one from Governor McNutt's plantation, one from the plantation of Dr. Bird, and one from that of Mr. Davis."—*New Orleans Bee of July* 24.

The editor of the New Orleans Bulletin is of the opinion that "the recent floods will reduce the cotton crop about 250,000 bales."

The St. Landry (Louisiana) Whig says:

"We are truly sorry to announce that the cotton crop in this parish is lamentably cut up. The caterpillar is making sad havoc. We learn that many of the planters on Bayou Bœuf contemplate abandoning cotton altogether, and intend planting the sugar cane. The cotton crop this year, in most of that section, will not yield half the usual quantity; and all around us, a third at least will be lost. We are no alarmists, but 'speak the words of soberness and truth;' and people at a distance may rely on this statement."

The caterpillar.—The Red River Republican says:

"In our last we mentioned the appearance of the dreaded caterpillar on our cotton fields. We have since received information from the country that puts to rest all doubts. The real insect, so destructive in other years, can be seen on almost every plantation in the parish. Every effort to arrest the progress of the destroyers has been in vain. They approach the tender plants in myriads, and the work of destruction is completed in a short time."

The cotton crop in Louisiana.—The New Orleans Picayune says:

"From what we have recently seen of the cotton crop in the eastern part of the State, and from what we have heard of it in the other upland sections, we anticipate an abundant crop. It is true that great destruction has been done to it by crevasses and overflows on the margin of the great, and some of the lesser rivers. The aggregate yield, notwithstanding, will be greater than that of last year by several thousand bales."

"The Caddo (Louisiana) Gazette says: 'We regret much to hear, from almost every quarter, of the great damage which is done to the crops by the extraordinary drought. On many plantations, as we understand, where it had been usual to make as much as could be gathered, there will not be made the present year more than 400 pounds of cotton to the acre. Picking has been commenced for some time, and a fair day's work is made; but it is feared that there will be but little left to open after the first picking.

The weed is often found drying up from the root to the top.' "—*Charleston Mercury.*

"*Cotton.*—The planters on the Mississippi, and many on the Red river, have, for some days, been picking cotton. The second planting on the river bids fair at present, and the crops look encouraging, should the frosts hold off a reasonable time."—*New Orleans Picayune of August* 3.

The crop in Louisiana.—A letter from De Soto parish to the New Orleans Bulletin, dated August 30, says:

"To my knowledge, crops in this vicinity are reduced from 1,200 to 550 and even 500 pounds per acre, owing to the plant shedding the bolls; and it is too late in the season now for new growth to mature and yield. The product of cotton in the three parishes of De Soto, Natchitoches, and Caddo, taken collectively, are cut short nearly one-half."

The Baton Rouge Advertiser, of September 11, says: "The caterpillar is doing immense destruction on the cotton plantations in this parish. Wherever the crop is late, the bolls being tender, and new 'forms' constantly emerging, the yield will be *more than one-half less* than the anticipated crop. This is the opinion of a highly respectable planter, with whom we have had conversation on the subject."

"*The army worm.*—This destructive insect to the hopes of the planter has made its appearance in terrible quantities throughout the State. A gentleman, just from the 'Opelousas counties,' informs us that the caterpillar has made its appearance in that region three weeks since. Within the past six days, it has passed over the broad fields of Concordia, leaving them as if a whitening frost had blasted them. One-third of the crop, at least, in this region has been destroyed; how much more, time will determine. With the overflow, and now the army worm, the planter has but a slender prospect of being remunerated for his labor."—*Concordia Intelligencer.*

"We learn from a gentleman, just from Milliken's Bend, La., that the caterpillar, or army worm, is making great havoc with the cotton crop in that section. He says that, on nearly all the plantations in the Bend and on Willow bayou, the cotton is stripped of every leaf, and the young bolls eaten up."—*Vicksburg Whig.*

"*The crops and the season.*—We continue (says the New Orleans Bulletin) to receive the most discouraging accounts from the Red river district, particularly the large parishes of Natchitoches and Rapides. The caterpillar, we are assured, has committed unexampled devastation in many parts of those parishes and in Avoyelles. It prevails also on Black river and the Washita, though to what extent we have not heard. From other parts of the State, we have the following intelligence, through the papers of the interior."

The Concordia Intelligencer says, that "the caterpillar, or army worm, is more than usually destructive in the parishes of Rapides, Catahoula, and Concordia."

The New Orleans Bulletin says: "We spoke yesterday of the ravages committed by the caterpillar in the Red river parishes. The Alexandria Republican of the 31st ultimo confirms the worst reports we have received."

The Alexandria Republican has the following in relation to the cotton crop:

"*The caterpillar.*—We regret to learn that this insect has appeared in the cotton fields at Bayou Bœuf, and at other points. Its ravages are said to be extensive, and we are fearful that the replanted crop will be partially,

if not wholly, destroyed. Some think it is not the real Simon Pure worm, so fatal in other years. A little time will tell."

"A visit to Bayou Reef," says the Republican, "has given us ocular proof of the fearful ravages of the dreaded caterpillar. The work of destruction has been complete. Scarcely a green leaf is to be seen in any direction—the plantations resembling rye fields. In the opinion of the best informed, the yield in the parish will not be more than one-third of the average crop. Bad news, but true."

Such is the substance of the intelligence which, from time to time, appeared, respecting the cotton crop of Louisiana.

The crop of Arkansas, notwithstanding the unusual floods, will, it is believed, be "equal to that of the former year—perhaps a little above. The uplands yielded abundantly, and there was an increased quantity of land cultivated." In the earlier part of the season we find the following statement:

"*Crops in Arkansas.*—The Van Buren Intelligencer of the 31st ult. says: 'The corn crops in Washington, Crawford, and Franklin counties, (Ark.,) will be very short. The cotton will be fine; and, from the aspects, we judge a much larger shipment of cotton will be made this season, from this port, than upon former occasions.'"

Mississippi is thought by some entitled to rank first among the cotton-growing States. Whether or not this be allowed, we cannot doubt that a large amount of cotton is raised in this State. The cotton crop here, however, suffered very much by the floods in the early part of the season. We place together some notices which we have taken from the public journals at the time, to form some idea of the progress of the crop in Mississippi:

From the New Orleans Bee.

"*The growing cotton crop.*—The following are extracts of letters received by a merchant of this city:

"*Natchitoches, April* 24.—'The worms have in a great measure destroyed our cotton, and we have not got seed to replant.'

"*Natchez, April* 29.—'The drought continues, and the complaints of the planters, consequent upon it, of the backwardness of the cotton crop; more or less of the seed on almost every plantation remaining as it was put into the ground unchanged, except that which has rotted, and will require to be replanted.'

"*Woodville, (Miss.,) 29th instant.*—'I have my crop all planted; and without rain for the last 47 days, except two or three light sprinkles, and a very light sprinkle yesterday. My cotton has come up badly; and, without some rain shortly, will have but poor stands.'

"*Madison county, Miss.*—The Mississippi Creole states that 'many of the cotton crops will be very light. The worms have been very destructive on many plantations, and many have been injured by drought.'

"Extract of a letter from Mobile, of July 1.—'We learn from a highly respectable planter, who plants on Red river above the raft, and whose plantation was inundated in April, and who was obliged to replant, that his prospect was good for a fair crop; but below the raft, and on the Arkansas and Mississippi rivers, the late inundations have covered 150,000 acres of cotton land, which are from two to eight feet under water, and cannot be replanted this season. The estimated loss of cotton is from 150,000 to 200,000 bales.'

"*The crops.*—The news from Mississippi, and from the upper part of this State, represents the cotton crop as still suffering for want of rain. The following is an extract of a letter from a distinguished planter near Natchez, to a commercial house in this city. It is dated Natchez, May 4th, 1844:

"'Unquestionably, and beyond the shadow of a doubt, the prospect of the crop now planted has not been as unpromising for the last 25 years. We have had the longest and severest drought ever known at this season, causing a complete check in vegetation. There is nothing in the fields for the insects to feed upon; and, consequently, the cotton is cut down by worms, caterpillars, and grasshoppers, as soon as it makes its appearance through the surface. Thousands and tens of thousands of acres are now being ploughed up, and planted over; and the demand for cotton seed is so great, that $1 per bushel has been paid for large quantities. We plant about 2 bushels to the acre."'—*N. O. Picayune, May 8th.*

A gentleman in Mississippi writes, under date of May 13: "We have not had rain since the 1st of April. Our cotton is now beginning to branch off, and form blossom buds, or forms—the largest 1 foot high. The cut worm has made sad havoc on some farms. I have had to replant cotton twice."

"*Vicksburg, June* 28, 1844.—From a re-examination of the overflow thus far up the river, and from all I can hear, I now believe my former estimate of loss to the growing cotton crop, by reason of this extraordinary inundation, was too low. It would appear, from the best information I can obtain, that the damage will not be less than *two hundred thousand bales.* The crop on the high lands looks well, but is backward, and stands rather thin on the soil. Should any casualty attend the crop on high ground, the aggregate crop of the year will be a very short one. The plant on the high land is subjected to the ravages of an insect called the army worm—a species of caterpillar, which produces a butterfly late in the summer. They usually attack cotton plants in July and August, when they begin to produce young bolls, which they ring and cut off, as also all the tender shoots and leaves. They have been known to destroy whole fields of cotton in a single night. No remedy or protection against this destroying blight has as yet been discovered. Their ravages are principally confined to the crops on the high lands. There is another species of small caterpillar, that often attacks the plant while very young, cutting off the tender stalk close to the ground. This insect works early in the spring. Later in the summer, it is changed into a pretty moth—such as often lights about dwellings. The ravages of this insect are less than those produced by the army worm. At present, the cotton crop is beyond their reach. The weather continues excessively hot."

"*Cotton crop.*—The Natchez Free Trader says: 'We learn from planters cultivating the hill land of some portions of this country, that the worm has become very destructive, eating up and destroying whole fields of the growing or ripening crop.'

"From a correspondent who resides in the interior of the State, we also learn: 'The present year has not been favorable for culture in this region. Some had no rain; others, enough; others, again, too much.'"

From a letter dated June 18, in Yazoo county, we are informed: "Our crop in this valley is unusually fine for the season, and fully three weeks more forward than the last. Picking will commence about the first week in August. No rain from the last of March to the last of May. Too dry

to get a rise of cotton, which of course affected stands. This, with a very heavy rain, then a long dry spell, has caused really a shorter crop than usual, though our very excellent fall and early opening has allowed us to save all we have made. As a specimen, one field that I have finished this year has yielded me this year 911 pounds against 1,136 last year. Nothing but an extra late frost gave me over 600 or 700 pounds. The improvement in culture has aided somewhat, but the fall has done all, which no man could have anticipated after one frost in September, which was very remarkable. I make my estimates from my own personal measurements and weight, and can assure you that, up to October 1, I never had a worse per acre prospect."

In another section, we learn that "the cotton crop is about the same in *quantity*, and much better in quality, than in 1843."

And, again, in another part of the State: "Cotton far better in quality, and about the same in quantity."

In still another, we are told that the cotton crop was "more than an average one, exceeding any crop for the last five years from 100,000 to 200,000 bales."

As the deficiency of the crop for 1843 may perhaps have been estimated too high, we are inclined to believe that the crop of 1844 may have yielded from 15 to 20 per cent. more than that of the previous year. One of our correspondents estimates the crop at 450,000 bales, which is not far from the one we have given.

The crop in Tennessee, if we were to judge from the following extract, promised well.

The American Eagle, published at Memphis, Tennessee, says: "The prospects of the cotton planter being munificently rewarded for his labor by an abundant crop were never more encouraging in this region. The plant is very forward, and the bolls are already beginning to open. It is the general expressed opinion, that we are to have the heaviest crop ever gathered, provided the present prospects are not blighted—of which, to any considerable extent, there is but little danger."

But, as it would appear, in the Tennessee valley the expectation was not fully met. Thus it is stated: "The average, through the valley, will be from 550 to 600 pounds seed cotton to the acre—200 pounds less than the average for this valley. It began to open 20th of July, and we began to pick 10th of August. It will be gathered early, and will be a beautiful article, worth two cents per pound more than the last crop to the manufacturer; for it will be *dry*, *sound*, and *clean*, and will make more and better thread." On the whole, we think there was an increase of from 15 to 20 per cent.

Of the crop of Florida, (to judge from the extracts which follow,) there must have been an increase of at least 20 to 25 per cent. over the crop of 1843.

"*The cotton crop, caterpillars, &c.*—The Tallahassee Floridian, of the 31st ult., says: 'The cotton crop promised well until the appearance of the caterpillar, the first of the month. At all events, we are informed that the cotton crop will be a third more than last year; but, at the present low prices, the planter would much rather double it.'"

Cotton in Florida.—"The Tallahassee Sentinel, of the 10th instant, says that an abundant yield of cotton is expected throughout that district,

and that, in the absence of any untoward blight, planters will make as much or more than they gan gather."

It will thus be seen that the crop of 1844 is much larger than that of 1843. The low price of other articles, and the rise of cotton in the early spring, prompted to greater cultivation; and we believe that, taking into view the amount of stock on hand, the crop this year has been an over production.

The whole crop for the United States is estimated at 872,107,000 pounds.

The cause of rust in cotton is ascribed mainly (by Mr. Ruffin, in his agricultural survey) to the depredations of myriads of very minute insects, to which the green cotton plant furnishes their best, if not their peculiar food. He adds, that though other causes may aid these insects—as weather, &c.—yet "it may be presumed that they would not be present, or be very few in number, if the preceding crop had not been cotton, but some other crop, on which these insects could not live."

General Hamilton, in an address before an agricultural society, remarks, on the culture of cotton: "That the rows ought invariably to run north and south; that not only the least amount of shade should be cast upon the plant, but that, as our winds prevail in the summer months, the highest amount of atmospherical nourishment may be given to the plant." He adds: "I believe, moreover, after the full moon in July, the perpendicular stem of all cotton over 4½ feet high should be topped; and two or three of the long lateral branches on the full moon in August. I am satisfied that in rank and wet seasons we should make at least one-third more to the acre, by adopting this process."

He refers in support of this view to the principles laid down by Liebig, and also approves highly of Dr. Cloud's theory, as resting on the true philosphy of the plant. In a communication from Dr. Cloud on the subject of his method, he says to us: "My experiments in improving the culture of the cotton plant are rapidly gaining ground among planters; and I think I have reduced it to a positive demonstration, that cotton may be grown on the improved plan of manure and checks, and be sold in the market by the planter at 3 *cents per pound*, at least more profitably than it can be grown and sold on the ordinary plan of the country at 6 to 8 cents per pound."

The subject of preparing cotton for the market is one which at the present time deserves the serious attention of the planter. While the over production is so great, and the price so low, his success must depend much upon the superiority of his cotton; and, of course, that which, other things being equal, is best prepared, will find the readiest sale and command the best price. On this subject we subjoin the following suggestions from an experienced person, which we take from the Southern Cultivator, published in Georgia. He says: "I take all the care I possibly can in picking it out of the field, endeavoring to keep up with the opening as near as possible, taking all the pains I can to pick it clear of trash; I then dry it thoroughly on a scaffold, keeping one hand picking it over while the cotton is drying; I then pack it away cleanly in bulk, suffering it to remain until it becomes heated. My finest cotton last year remained in bulk about two months; this year I think of letting it remain three months in bulk. After it has remained long enough for the oil to be drawn from the seed into the staple, to give it that beautiful cream color so much admired, I then commence ginning. I gin it very slowly on a fine saw gin, picking it over again as it is ginned, so as to get out any remaining trash that may be in it. I have

a flue that is fixed to the gin, through which the cotton passes after leaving the brush. The flue is eight feet long, and so constructed as to let all the dirt and trash drop in a box below, as the cotton passes over the fingers of the flue; the cotton passes from the flue into the cotton room. I never suffer much to be packed in the room before putting it in bales. This is done with the greatest care. I press it down with a screw, instead of treading it with feet, as every pressure defaces the cotton to some extent. My bales weigh about 480 pounds. I sew up my packages very nicely, and put up my cotton in the best of bagging.

"Now, I request the farmers, before they condemn my plan as too tedious, to make the trial, and they will find it a money-making business. I would however state, that I make three qualities of cotton. My first and second qualities I plainly put my name on, and the place of my residence; the third quality I put the letter M on."

The increasing amount of the cotton crop from year to year, which finds no market to keep pace with the production, begins justly to excite serious apprehensions as to the result. In the public journals and agricultural papers of the cotton-growing States, we find frequent communications pointing to the necessity of curtailing the cotton crop, cultivating a sufficiency of provisions on their own lands, and manufacturing at home the articles which are purchased from other States. The stock on hand will be much larger than usual. Add this to the larger crop of 1844, and the remaining stock (even allowing considerable for increased consumption) will be advanced so that eventually the amount left of one year may almost supply the demand of the year abroad. The duty has been taken off from cotton in Austria; but this will not produce any great change, as the amount taken will not probably reach to 50,000 bales. A correspondent in Mississippi makes the following remarks on this subject: "Emigration must soon cease to this State, as bringing negroes here expires by the limitation of our Constitution in 1845.

"We have an immense territory not yet settled; much of it is choice land for cotton, which will be a dead capital to our speculators, who invested their borrowed bank paper; who will, by eloquent appeals to my countrymen, endeavor to prove that the Constitution should be amended, so as to settle up our fertile lands; but this will not take.

"We may therefore hope that some check will be given to the production of cotton, it having already reached to a fearful amount. We enter the European market, this year, with a capital of (say) 2,200,000 bales; a stock on hand, October 1, of 904,000 bales. The consequent prices are *below the cost of production; we cannot grow it for* 4 *cents nett, at the present high prices of negroes, &c.*

"But, suppose this crop exceeds 2,300,000 bales, as some suppose, and consumption proceeds as for 1842 and 1843; we must then enter the market, October, 1845, with a stock on hand of over 1,300,000 bales, with the prospect that before 1847 we will have enough for two years' consumption then in the market. Will it then sell?" He adds, that the price of slaves there is higher now than in the hard times; and that a trader in Vicksburg, having a number of negroes, could not sell one in twenty days, as sugar planters only were buying or inquiring.

As to the demand for cotton, a writer in Hunt's Magazine for December last says: "The increase in our consumption has been pretty regular." He places it for the winter at 347,000 bales, which is an increase of 5.5 per cent.

a year. "If this ratio be allowed," he says, "this will give 370,000 bales as the consumption of the American manufactories for 1845."

The French consumption he estimates at 420,000 bales; and he allows the other demands on the continent to be 180,000 bales. He allows the English consumption to be 1,480,000 bales; and, with the data he has taken, he thinks there will be an excess of supply for a year of 300,000 bales; which, added to the stock on hand, will constitute a large amount. The stock on hand at Liverpool, September 13, 1844, was 921,000 bales. The receipts from other sources, besides the United States, are becoming larger, and leaving a proportionate increase every year.

In appendix No. 12 will be found some extracts from a late English paper, which present what is probably as fair a view as could be taken of the aspect of this crop in its relation to the European market at the close of 1844.

The following account of sales, imports, &c., to November 29, 1844, is taken from the European Times, and furnishes suitable data for estimating the yet further prospect of this most important crop.

Account of sales, imports, exports, stocks, and prices of cotton, to this day, November 29, 1844.

Sales. Same period, 1843.	Sales. This year.	Sales. This week.	Description.	Current prices. Ordinary, to middling.	Current prices. Fair, to good fair.	Current prices. Good, to fine.	Prices paid. This week.	Prices paid. Same time, 1843.
Bales.	*Bales.*	*Bales.*		*d.* *d.*	*d.* *d.*	*d.* *d.*	*d.* *d.*	*d.* *d.*
14,560	8,310	20	Sea Island - - -	10 *a* 11	13 *a* 14	15½ *a* 21	12 *a* 12½	10½ *a* 21
2,150	1,580	-	Stained - - - -	3½ *a* 4½	6 *a* 7	8 *a* 9	-	4½ *a* 10
360,600	389,730	6,400	Bowed Georgia - - -	3¼ *a* 3¾	4¼ *a* 4⅜	4¾ *a* 5	3¼ *a* 5½	4⅛ *a* 6
278,590	291,730	5,150	Mobile - - - -	3 *a* 3⅞	4⅜ *a* 4½	4¾ *a* 5	3 *a* 4⅝	4⅛ *a* 6
			Alabama and Tennessee - -	2¾ *a* 3½	3¾ *a* 0	-	3 *a* 3¾	4 *a* 4⅞
714,950	634,090	9,550	New Orleans - - -	3 *a* 3⅞	4½ *a* 4¾	5½ *a* 6½	3 *a* 6½	4⅛ *a* 7¼
27,260	57,200	1,600	Pernambuco and Paraiba - -	4¾ *a* 4⅞	5⅛ *a* 5⅜	5¾ *a* 6¼	4⅞ *a* 6½	5¾ *a* 7
			Aracati and Ceara - - -	4¾ *a* 4⅞	5⅛ *a* 5¼	-	-	5¾ *a* 6½
20,070	25,840	500	Bahia and Maccio - - -	4¾ *a* 4⅞	5 *a* 5¼	5½ *a* 5¾	5 *a* 5¾	5¾ *a* 6¾
34,350	33,000	470	Maranham - - -	4¾ *a* 4⅞	5 *a* 5¼	5½ *a* 5¾	4¾ *a* 5¼	5⅝ *a* 6½
			Low-ginned Maranham - -	3¾ *a* 4	4⅛ *a* 4¼	-	4⅜ *a* 4¾	5 *a* 5½
39,920	50,720	1,210	Egyptian - - - -	4⅞ *a* 5⅛	5⅝ *a* 6½	7½ *a* 8½	4⅞ *a* 7½	6 *a* 8
2,010	750	-	Peruvian - - - -	4⅞ *a* 5⅛	4 *a* 4½	5 *a* 5½	-	5 *a* 6½
10,730	6,830	430	Laguayra - - - -	-	4¼ *a* 4½	-	4 *a* 0	4½ *a* 5¼
4,860	2,400	130	Common West India - -	4 *a* 4¼	4½ *a* 4¾	5¼ *a* 0	5 *a* 5¼	4½ *a* 6½
1,340	2,760	-	Carthagena - - -	3 *a* 3⅛	3¼ *a* 3¾	3½ *a* 0	-	3½ *a* 4¼
25,340	177,390	3,700	Surat - - - -	2¼ *a* 2½	3 *a* 3½	3¾ *a* 4	2¼ *a* 3½	3⅛ *a* 4½
			Madras - - - -	-	-	-	-	4 *a* 4½
1,656,730	1,682,330	29,160						

Account of sales, imports, &c., of cotton—Continued.

Sales. Same period, 1843.	Sales. This year.	Sales. This week.	Description.	Imports. This week.	Imports. This year.	Imports. Same time, 1843.	Estimated stocks. Nov. 23, 1844.	Estimated stocks. Same time, 1843.	Consumption. Dec. 30 to Nov. 29, '44.	Consumption. Same time, 1843.	Exports. Dec. 30 to Nov. 29, 1844.	Exports. Same time, 1843.
Bales.	*Bales.*	*Bales.*		*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*
14,560	8,310	20	Sea Island -									
2,150	1,580	-	Stained - -	10,546	452,300	424,030						
360,600	389,730	6,400	Bowed Georgia -				542,750	449,520	966,660	1,003,490	50,710	53,062
278,590	291,730	5,150	Mobile - -									
			Ala. & Tennessee	5,452	672,401	814,580						
714,950	634,090	9,550	New Orleans -									
27,260	57,200	1,600	Pernambuco & Paraiba - -	-	52,953	42,039	32,920	31,950				
			Aracati and Ceara									
20,070	25,840	500	Bahia and Maccio	-	24,354	20,745	16,630	12,590	102,470	78,430	1,000	3,807
34,350	33,000	470	Maranham -	-	34,105	30,793	26,440	24,210				
			Low-ginned Mar.									
39,920	50,720	1,210	Egyptian -	372	57,229	43,180	41,620	24,560	41,600	38,130	30	
			Barbados -	-	622	244						
2,010	750	-	Peruvian -									
10,730	6,830	430	Laguayra -									
4,860	2,400	130	Common W. India	-	18,258	14,795	11,440	16,080	12,890	16,180		
1,340	2,760	-	Carthagena -									
			Smyrna - -									
			Manilla - -									
25,340	177,390	3,700	Surat - -	3,484	136,110	98,585	140,440	97,510	101,470	89,590	4,478	9,752
			Madras - -									
			Bengal - -	-	50	533	250	530				
1,656,730	1,682,330	29,160		19,854	1,443,382	1,489,524	812,540	656,950	1,225,090	1,225,820	56,218	66,621

Taken on speculation to this date - - - - - - - - 432,250 bags.
Taken same period of 1843 - - - - - - - - - 457,900 "

"The import into the kingdom this year has been—

Bags,	1,211,271	American;	1,629,426	of all sorts,	in 1844.
"	1,341,312	"	1,664,770	"	in 1843.

"The stock, on the 30th November, was—

Bags,	602,400	American;	972,900	of all sorts,	to 1844.
"	496,700	"	1,287,853	"	in 1343.

"It is thus shown that the stock is at present 180,300 bags more than last year; and the new crop is arriving freely, so that no great diminution in the stock can take place; and, consequently, an improvement in prices may be considered out of the question."

Texas, with her rich cotton lands, will soon be pressing yet further into competition. The experiments in India are not yet abandoned. The following, relating to this subject, is taken from the Southern Cultivator, a paper published in one of the largest cotton-growing States, at Augusta, Georgia:

"*Growth of American cotton in India.*—In regard to the culture of American cotton in Bengal, it must be admitted that, although the experiments have been numerous, and, in some instances, on an extended scale, the whole have hitherto been conducted by amateurs, many of whom, having satisfied a temporary wish to try the culture, have abandoned it, whether successful or otherwise; so that it is almost impossible to form a decided opinion as to how far the cultivation would answer in a commercial point of view. Of late, however, there appears to be a desire, on the part of the Government of Bengal, to take up the culture, as evinced in the appointment last year of a gentleman who has had considerable experience in America, for the express purpose of reporting, after a careful investigation, on the capabilities of the climate and soil of Dacca, and the surrounding districts, for the introduction of the foreign staple. We alluded to this circumstance on a former occasion; and we now learn, from the reports which the deputy governor has considerately placed at the disposal of the agricultural society, and which were submitted at its last meeting, that, during the last eight months, Mr. Price has been engaged in travelling over various parts of Dacca, Furreedpore, Tippera, and Bulloah, situated on the Dultussary, Conni, Megna, Burrapootra, Luckia, and other rivers in that tract of country; and has seen many spots on which the foreign cotton could be cultivated to advantage, more particularly on the islands situated on the Hottea and Surdeep, as also on other small islands situated on the Hottea river, in consequence of their contiguity to the sea. Some of his experiments have been successful, while others have failed; but in no instance does he appear to have received fresh seed in time to sow at the proper season; so, on this very essential point, he may be said to have labored under a great disadvantage, besides experiencing other minor difficulties incidental to nearly all first attempts at a new culture.

"Notwithstanding these natural obstacles, he seems to have seen enough to induce him to hold out sanguine hopes that, if advantage can be taken of the proper season, he will be able to cultivate the plant to advantage in the Dacca district. In consequence of this favorable opinion, we understand that Government have it in contemplation to commence the work in earnest, by the appropriation of such tracts in the district as, from previous examination, may be considered most fitting for the cultivation of American cotton, and combine therewith a matter of even still greater importance—namely, the increased cultivation and improvement of the indigenous staple."—*Calcutta Star.*

And again:

"*Cotton in India.*—The following item of news, received by the late arrivals from England, will be interesting to some of our readers:

"The report of the Bombay Chamber of Commerce, contained in the India newspapers, shows that the experiments in growing cotton have been, on the whole, successful.

"A specimen of Nurma cotton was pronounced to be a very fine, soft, long, strong, and clear-colored staple, which would compete with the very best American short staple cotton, could it be produced in sufficient quantity."

The statement below is one which deserves most serious consideration:

"*East India cotton.*—It appears by the latest advices from Liverpool, that, notwithstanding the large amount of cotton sent from India to China, the importations into Great Britain during the past year, from that quarter, have been larger than ever before. It also appears that East India cotton has been so much improved in quality, that it now competes even with Mobile and New Orleans cotton; the best of the former selling as high as 3⅝*d.* per pound, while the lowest of Mobile brought 3¼*d.*, and New Orleans 3*d.* Besides this, while the imports of East India cotton have *increased*, during the year, to the amount of 62,757 bales, those of American cotton have *decreased* to the amount of 272,983. Decrease of American cotton, twenty per cent. Increase of East India, forty-three per cent."

"The valuable qualities of cotton in their relative order," (says Mr. Seabrook, in his treatise on the subject,) "are strength, firmness, length, evenness, and freedom from knots and entanglements." He says: "The recognised distinctions on the continent of Europe are as follows:

1. The North American.
2. The West Indian.
3. The South American.
4. The East Indian.
5. The Levantine.
6. The African.
7. The Italian.
8. The Spanish.

"The relative value of the above cottons is as follows:

Sea Island.
Bourbon.
Egyptian.
Bahia and Pernambuco.
Motril, from the kingdom of Granada.
Cayenne, Surinam, Demerara, and Berbice.
Superior West Indian.
New Orleans.
Upland Carolina.
Georgia.
Tennessee.
Inferior West Indian.
Levant—European and Asiatic Turkey.
Italian.
Madras.
Surat.
Bengal."

The application of cotton for a variety of articles has been suggested as a mode of increasing the consumption of the article. Perhaps none of these is more important than that which is contained in the following, which we take from the American Farmer, which, as it will be seen, credits it to the Cultivator:

The whole of the paper in the Southron will be found in appendix No. 12.

"We find the following in the Albany Cultivator: Cotton beds are becoming very much in use on steamboats on the Western rivers, and are considered superior to any kind but hair."

"*Cotton beds.*—We have received, from J. A. Guernsey, Esq., a copy of the 'Southron,' published at Jackson, Mississippi, containing some remarks on the advantages of cotton for bedding. These advantages may be summed up as follows:

"It is claimed that it is the cheapest, most comfortable, and most healthy material for bedding that is known in the civilized world. In addition to these, may be named *superior cleanliness;* vermin will not abide it; there is *no grease* in it, as in hair or wool; it does not get *stale*, and acquire an *unpleasant odor*, as feathers do; moths do not infest it, as they do wool; it does not puck and become hard, as moss does; nor does it become dry, brittle, and dusty, as do straw and husks; and in may cases it is *medicinal.* It is said not to cause that lassitude and inertia which is produced by sleeping on feathers. People not acquainted with it have supposed that they have been sleeping on the best feathers, when in fact their beds were made of cotton." The relative cost of cotton, compared with feathers, hair, &c., may be seen from the following statement:

Cost of a hair mattress.—They are generally sold by the pound, and cost from 50 to 75 cents per pound. Thirty or forty pounds will cost $15 or $20.

Wool.—Thirty pounds of wool, at 30 cents per pound, $9; twelve yards of ticking, at 12½ cents per yard, $1 50; labor, thread, &c., $2 75. Total, $13 25.

Feathers.—Forty pounds of feathers, at 30 cents per pound, $12; fifteen yards of ticking, at 12½ cents per yard, $1 87½; labor, &c., $2 75. Total, $16 62½.

Cotton.—Thirty pounds of cotton, at 8 cents per pound, $3 40; twelve yards of ticking, at 12½ cents per yard, $1 50; labor, thread, &c., $2 75. Total, $7 65.

It is recommended to run the cotton through a "picker," where one can conveniently be obtained, before using. This gives it additional cleanliness and buoyancy.

The substitution of cotton for bedding, throughout the United States, would be an immense saving, besides opening a new avenue for that article to an extent, according to the estimation of this writer, equal "to more than two of the largest crops of cotton ever produced in the United States."

Other suggestions are made, like another article, also from a Southern journal: "The following admirable hints we find addressed to the farmers of South Carolina by a correspondent in the Southern Agriculturist. We wish that they might reach and be heeded by all; for it is certain that the stock of cotton on hand in Europe is fearfully accumulating, and that so long as this process is going on, it must continue to fall. There is no escaping this dilemma; and the sooner our Southern brethren look

this matter in the face, and provide for it by a change of system, the better it will be for them. We hope they will take these observations kindly, for they are kindly meant.

"There is a partial, if not complete, remedy for this evil, which I take the liberty of suggesting through your pages. Let every cotton planter make it a rule, and adhere strictly to it, to make no more cotton than he can make clear of his plantation expenses; that is, let him pay all his plantation expenses by other crops, and make only so much cotton as will support his family, pay his debts, and add to his property. Many planters, I dare say, will answer, that they would be glad to make enough cotton to pay their debts and support their families. This may be true as to some; but, in general, it would be more pert than true. Even those who are hardest run, purchase corn, salt, negro clothes, &c., with 'cotton' money. I doubt if there is any planter who could not produce enough for market, besides cotton, to pay for all these things and all plantation expenses. Some are so situated that they could sell corn alone sufficient for the purpose. Let them increase their corn crop, then, to that amount, and diminish cotton. Others, again, if the corn could not be sold, might feed it to stock, and sell that. It will bear transportation; and there is a great deal of foreign beef and bacon sold in the cotton region. Wheat and flour, in the middle and upper country, could be made to pay these contingencies. Rice will grow at the foot of the mountains, and command a good price; and so will tobacco. Many could pay these expenses by cutting timber and making shingles, staves, &c. In short, there are few planters in the whole cotton region who might not, by a little diversion of labor, manage to make what cotton they do clear of the expense of production, and do so profitably. Let each planter look around him, and see what his resources are. I do not invite him to make his own shoes, hats, blankets, clothes, salt, and iron. In most cases, others, who are in these lines, can make these things and bring them to his door cheaper than he can make them himself. But he can follow the business he understands, or at least is best prepared to carry on, and make something else besides cotton to pay for them. I know the folly of recommending any measure to planters requiring their combined action. I recommend this to each planter, for his own individual advantage, as well as for the sake of the whole. While it will diminish the aggregate crop, if it curtails but a bale, it will teach each man to be independent, to a certain extent, of cotton speculators, open his eyes to his own resources, and gradually prepare the way for that change of culture which is inevitable and at hand for all those who cannot make a heavy bale to the acre. And I would add, that every planter should, as speedily as possible, reduce his culture to such land only as will make a heavy bale per acre. If he has none such, let him 'make it.' Manure will soon do it. Cut down the cotton, increase the corn and pea crops, pen hogs, cattle, and every thing else, on straw, muck, weeds, &c., and he will soon have as much land that will raise him a bale to the acre as he wants, if he makes no more cotton than he makes 'clear.'

"I preach no more than I practise. I am a middle-aged planter, and have nearly always made my cotton crop clear. I have suffered my share in the hard times, and have met, I think, more than my average of losses: yet I kept aboveboard, without any stringent economy, mainly because I have paid plantation expenses by selling corn, peas, oats, &c. My expenses have been as heavy as any planter's of the same force, and my land

probably as poor; yet I have kept up chiefly, I think, because I did not have to pay them in a lump at the end of the year out of my cotton, which would have left me so small a surplus that probably I should not have thought it worth taking care of. The balance would have been mere odds and ends, which few know how to make tell. I have made corn, &c., supply my odds and ends of cash, and appropriated them, as they came to hand, to pay current expenses; and when my cotton came in, I could do something with my little *lump of clear money*. Let me say, also, that, after next year, I shall not plant an acre but will (or, at least, ought to) yield me 400 pounds of clean cotton—not one; and not many, I trust, next year. Yet my land, in its best natural condition, will not average half that much. What I adopt for my own good, and experience has proved to me is for the good of every planter, both individually and collectively, I recommend others to try."

Suggestions like these deserve to be pondered. There are various products which may be substituted, some of which will be more particularly considered further on. Among these are madder, indigo, raising of sheep, of the alpacca, making of silk, &c.

It is stated, in an agricultural address delivered in Mississippi, that Judge Bry, of Louisiana, who has for fifteen years been engaged in raising silk, says that he could produce silk on his plantation to the value of several thousand dollars, without planting one stalk of cotton less, or interfering perceptibly with the cotton crop. Whether or not this is so, there can be no doubt that the silk culture is admirably adapted to the South, and that it might supply a fine outlet for unprofitable labor in the overproduction of cotton.

The alarm is now so great, that conventions have been called in Mississippi and some of the other States, to take suitable measures to reduce the amount of cotton raised, as long as demand is comparatively less in proportion to the supply. The following resolution was adopted in the House of Representatives in Alabama, and referred to a select committee of nine members:

"*Resolved*, That the increased production and diminished price of the principal staple of this State admonish us of the propriety of seeking new sources for the employment of labor and the investment of capital; and that, as preparatory thereto, it be referred to a special committee, to report as to the expediency of providing, by bill, for an accurate and full geological survey of this State."

This measure will no doubt prove very beneficial, as it will tend to develop the resources of the State. Another benefit would be, the establishment and steady support of an agricultural journal, which may bring within reach of the agricultural population those features of cultivation and kinds of products which are best adapted to their circumstances. The introduction of improvements and comforts will always keep pace with the knowledge on the subject which is obtained. By the investigations into the nature of the soil, and the proper means of culture, the most excellent crops may be produced, and an article that will always find a ready market at an advanced price. The attempt to discourage the production by mutual promises not to cultivate will scarcely be found more successful than former ones have been. Jealousies and individual interests will more or less be seen to clash with such a project; but the working up and applying more of the article in various forms on their own plantations, or in

the vicinity, with the distribution of a portion of their laboring force towards other objects, forms the surest remedy on which to rely. Dear-bought experience, however late, will at last unite all the planters in this conviction, and then a brighter day may dawn on the great cotton-growing States. Their lands are rich, and means still further to enrich and improve them lie fully within their own reach. The variety of products which may minister to their own comfort as food or clothing may readily be obtained from their soil and domestic industry, when once inventive genius shall put still further into operation the physical strength and local advantages which invite them to convert their crops yet more directly among themselves to the supply of all their necessities.

RICE.

In tracing the progress and result of the rice crop, we are mostly confined to a single State; for although this product is raised in some of the other States, yet the very large proportion of the crop which is grown in South Carolina is so great, comparatively, that the indications of it are to be traced from its appearance in this State.

From all that we can learn respecting the rice crop of 1844, it is an unusually fine crop—probably from 20 to 25 per cent. better than in 1843. The following are a few of the notices which have been gathered from the public journals in South Carolina, Georgia, and Louisiana, respecting the growth of this crop:

"The crops in this neighborhood," says the Winyah (S. C.) Observer, of the 6th July, "look quite as well as usual, and the rice crop is more forward than we have known it. On the 28th ultimo we saw an ear of rice taken from a field of Mr. Reuben Pringle, on Black river. The field was planted on the 18th of March, and by to-day must be shooting out generally. The rice will be certainly ready for harvest by the second week in August, which is unusually early."—*Charleston Patriot.*

"*The rice crop.*—We saw a few heads of rice on Saturday last from a plantation adjacent to this city, which looked exceedingly well for the season, though perhaps not quite as forward as last year. It was the opinion of intelligent rice planters that the crop promised to be a fair average one, and that the harvesting would commence about the 20th to the 22d of August."—*Savannah Republican of 24th July.*

"*The season and the rice crop.*—The Winyah (Georgetown) Observer, of the 14th July, says: 'From the 7th to 11th of the month we have had a succession of northeast winds and rain, which suspended the harvest for the time, and kept the planters in suspense as to a gale. On Wednesday the weather cleared up, and the harvest was again resumed, and is going on finely.'"

From the Savannah Republican of July 25.

"*The new rice crop.*—We saw a few heads of rice on Saturday last from a plantation adjacent to this city, which looked exceedingly well for the season, though perhaps not quite as forward as last year. It was the opinion of the gentleman (Rev. Mr. Godfrey) who showed us the specimen, and of other intelligent rice planters present, that the crop promised to be a fair average one, and that the harvesting would commence about the 20th to the 22d of August."

The Winyah (S. C.) Observer, speaking of the rice and other crops, says: "The rice crops in the neighborhood are equal to an average, and on some

places better; and the general belief is, that a full average crop will be made. We saw a head or two yesterday, from Mr. Gilliard's plantation, 13 inches in length, well grained, which he thinks will be ready for the hook about the 18th of next month.

"The upland crops in the neighborhood, which were planted early, and well worked in the early drought in June, will yield an average harvest also; but, from the back parts of this district, and many of the adjacent ones, accounts as to the corn and potato crops are unfavorable; so much so, that in some neighborhoods not half a crop will be made."

"*Rice crop.*—One or two planters on the river commenced cutting their rice on Saturday, and others on Monday last; though we are informed that the harvesting will not be general for a week to come. The prospect for a fair crop is good; and if the weather should prove favorable, we may expect a full average yield."—*Savannah Republican.*

"*Rice harvest—new rice.*—We were in error on Friday, in our market report, in stating that many planters already had their entire crops down. It is true that all are progressing rapidly with their harvesting, but still they are not so far ahead as we supposed. If the present fine weather continues, they will, no doubt, soon have their crops cut, and in fair way of being secured.

"One lot of the new crop, about eleven or twelve hundred bushels, from the plantation of Mr. Cheves, was received here on the 21st instant—earlier than ever known before. It has not been beat out yet, as the seller and the purchaser cannot agree upon a price for it."—*Savannah Republican.*

"The rice planters on Cape Fear are now busily engaged in cutting and getting in their crops. We are informed that the yield this year is fully an average one. There has been no storm during this month to damage the crops to any extent."—*Wilmington (N. C.) Chronicle.*

"*The crops in South Carolina.*—The Winyah (Georgetown) Observer says: The late crop of rice, just harvested, and now in the course of manufacture for market, is about an average one, and of good quality."

Elsewhere we see it stated that the rice crop was earlier than it had been for twenty years, and extra good.

"In an extract, which we subjoin from a New Orleans paper, we have an indication that the attention of the planters of Louisiana and Mississippi is turning more towards this crop. The writer says:

"'*Louisiana rice.*—A few days ago we received a beautiful sample of rice, raised eight miles back of Waterproof, in the parish of Tensas, in this State, and which we are told by good judges is equal in quality to the best South Carolina rice. We are glad to see that the planters of this and the adjoining State of Mississippi are turning their attention to the raising of other products besides cotton and sugar. There are plenty of cotton lands in this State which we have no doubt are admirably calculated for the growth of rice; and we doubt not our planters could easily raise sufficient for home consumption."—*New Orleans Tropic, October 5.*

The rice crop of Louisiana is said to have been a "full crop;" and we have felt authorized to allow an increase of from 5 to 10 per cent. in others of the States where rice is raised. The whole crop, therefore, will amount to 111,759,000 pounds.

Upland rice is cultivated to some extent in Illinois and other States north of the rice region. It is said, in the Cincinnati Ploughboy, to grow in the most arid soil; is sown some time in April, and is ripe in September. The

usual method as stated is, to sow it in drills about 18 inches apart; but if the land is well prepared and clean, it may be sown broadcast, and it often yields from 25 to 30 bushels per acre. It would probably grow well in some of the Northern Atlantic States.

By a careful analysis of rice and rice straw, by Professor Shepard, the following result is said in his report to have been obtained: "Considering a single rice plant in its dry mature state to weigh 100 grains, (a supposition which will often accord with the fact,) we shall have of mineral matter, in the different parts of the plants, the following number of grains:

In the stubble and root	36.08
Straw and leaves	36.08
Husk	14.20
Cotyledon and epidermis	11.70
Clean rice	1.94
	100.00

"As, however, in milling, nearly one-sixth of the cotyledon still adheres to the grain, for all practical estimates it will be nearer the truth to state the mineral ingredients of clean rice at 2 per cent. those of the whole crop; and to diminish, therefore, the residuum of the cotyledon and epidermis by 0.06 per cent.; making the per centage statement to stand thus:

Stubble and root	36.08
Straw and leaves	36.08
Husk	14.20
Cotyledon and epidermis	11.64
Clean rice (commercial)	2.00
	100.00"

He adds in a note: "It may be useful to present also a *per centum* view of the incombustible constituents of the rough rice:

Husk	51.00
Cotyledon and epidermis	41.81
Clean rice	7.19

"It scarcely need be stated that the cotyledon and epidermis are found in coarse rice flour intermingled largely with the husk, and with from 3 to 4 per cent. of clean and powdered rice. The cotyledon and epidermis are richer than the clean rice in saccharine matter and gluten, which materially augment the value of rice flour as a feed for cattle and swine. These principles are thus returned to the soil under the most favorable conditions for agriculture."

He draws, then, this conclusion: "If the foregoing views are correct, it becomes plain, at a glance, that the planter who sells his crop in the condition of rough rice robs his lands of 27.84 per cent. of the mineral ingredients of this species of produce; while, on the other hand, he who sells it as clean rice abstracts from them but 2 per cent. of these ingredients.

"But the true value of these constituents cannot be rightly estimated by their numerical proportions; since the mineral ingredients of the cotyledon and epidermis consist of above 50 per cent. of the most precious saline substances; while in those of the stubble, root, and husk, the like constituents

scarcely rise to 10 per cent., from the extreme slowness with which the husk suffers conversion into humus, unless fermented with stable litter. This portion of the rice plant appears to be almost wholly neglected by the planter; but, as it contains above 30 per cent. of carbon, it must be capable, when incorporated with the soil, of performing, to a considerable extent, the functions of the humus—*i. e.*, of gradually giving rise to carbonic acid, from combining with the oxygen of the air, and of raising the temperature of the soil by its *eremacausis*, or slow combustion. Besides, its minutely divided silica is in a more favorable condition for absorption by the roots of plants, than that which is offered them by the soil itself. We may add to these supposed useful properties of the husk, the mechanical service which, in certain stiff composts, it is capable of exerting, by laying the ground open to the access of air, and as an absorbent of moisture. As it is unlike to the stalk and leaf, in not containing alkali, it might, perhaps, be found advantageous to add wood ashes along with it, to the soils on which it is applied." The whole of Mr. Shepard's report of his analysis is interesting, as showing the elements of the rice, and its straw, &c.; and to those who cultivate this plant offers valuable suggestions for improvement in their practice.

SILK.

The subject of silk culture was so fully considered in the last report, that we have but little to add. Our particular information, also, respecting this crop for the year 1844, is comparatively limited.

From all we can learn, however, there can be no doubt that the subject is gradually becoming one of deeper interest. During the past season, in October last, a convention of silk culturists, similar to the one held the previous year, has been held at New York, which was well attended. Much information, we understand, was communicated, and placed in the hands of the secretary, the Rev. J. R. Barbour, of Massachusetts, for publication. We had hoped to receive this document in time for this report, that we might imbody some of the results which it presents to the people, for their consideration, and may possibly be able to do so before it leaves the hands of the printer, in one of our appendixes. As it is, we must rely principally on such scattered notices as we have been able to find in the public journals, and such other information as we have otherwise gathered. From a notice of the silk convention, published in the American Agriculturist for November, it is said, that "within two years there has been a vast increase in the manufacture of silk in this country—an increase amounting, it is supposed, to some three or four fold. In the growing of silk there has been also a large advance—an advance more difficult to estimate, as the returns are incomplete. We know enough, however, to be assured that the business has essentially surmounted the struggles of its infancy and its miserable nursing, and is now on its feet, and commanding the respect and confidence of intelligent men throughout the country." "Almost all who are now engaged in growing silk are preparing to enlarge their operations, and many new mulberry orchards will be planted in the following spring."

It appears that in some parts of the country the morus multicaulis suffered considerable loss from the winter of 1843–'44. Thus the Prairie Farmer states that "some patches that stood the hard winter of 1842–'43, perished during the uncommonly mild one of 1843–'44." A corres-

pondent of that paper thinks that the multicaulis is not the best for prairie lands; and states that, of 15,000 of his trees, not over 1,000 survived the last winter. Further experience is said to confirm the results of open feeding, which were published in "The Silk Question Settled," from which we quoted in the report of 1843. The Northampton association is said to have made, in this way, 150 pounds of reeled silk. John M. Summers, of Manheim, Lancaster county, Pennsylvania, has made the same quantity, also in the same way. Others, also, are said to have thoroughly tested the question, and to have become wholly satisfied that *worms must* have the pure air of heaven, except in *very early* or *very late* feeding. Others, too, have had good success in the ordinary way. This is stated to be the case with Miss Rapp, who exhibited, at the fair of the American Institute, ribands made of the silk of worms hatched of this year's (1844) eggs, and fed on mulberries which grew from seed which ripened in the same year. Other specimens of raw silk, &c., were exhibited; and, altogether, there was a beautiful assortment of the products of silk culture and manufactures, evincing the growing interest which is taken in the subject. At the same time, Mynheed Van Schaick, Esq., of New York, made a donation of $1,000 to the American Institute, to be expended in premiums to promote the silk cause. This will unquestionably have a happy influence in stimulating enterprise; and, at the same time, many who may not obtain the prizes will find themselves well rewarded in the increased profit accruing from their devotion to the subject.

As an evidence of the superiority of this country for silk culture, &c., General Tallmadge, president of the silk convention, observed, during the sittings, that when he was in Italy he noticed the eggs of the silk worm were always hatched by artificial means, on account of the moistness of the climate; and that no care was there required to prevent them from hatching. Here, however, owing to the dryness of our climate, the eggs must be put in ice houses and other cool places, to prevent them from hatching before the leaves of the mulberry are ready for them. In Italy, the books tell how to make the eggs hatch; in the United States, how to prevent them. From this, he thought it a clear inference that our country is most favorable for its production. Mr. Barbour laid stress on the fact, that the eggs used should be from healthy worms, and they should be kept in a uniform and healthy state. He recommends to put eggs into a tin box cased with lead, and place it in ice until the hatching season commences. No extreme transitions of temperature should be allowed. From the ice house let them be taken to the cellar, and then to a gradual heat, so that they will be 8 or 10 days in hatching. He declares that worms are much more liable to be injured from heat than from rain and dew. His plan is to keep the worms less exposed till after the second or third moulting, and then placed in tents; or he thinks it best to use artificial means at first, and then resort to open exposure.

Some interesting facts with relation to this subject will be found in the two letters of Doctor Stebbins, of Massachusetts, in appendix No. 13. One of these letters is taken from the American Agriculturist; the other accompanied some specimens of paper, much resembling what is called China paper, made of the bark of the mulberry tree. Some of the facts are mentioned in both; but it was thought best, however, to publish both of them entire. The paper shows what may yet further be done in this thing. It has the soft, silky feel, the external appearance, and peculiar smell, of the

paper which has been brought from China. The excellence of American silk has been well tested; and it is a fact that American silk is now sold under the name of foreign silk. A manufacturer writes that "the article of American silk is being produced to a considerable extent, but not equal to the consumption, by a large amount; but we believe, in a few years, with the protection we now have, we should be able to keep back the Italian."

To show how much the business has increased in France within a few years, we quote the following paragraph from a good authority:

"*Silk in France.*—Very little more than fifteen years have passed since there were in France only six departments in which there were extensive plantations of mulberry trees, for the general rearing of silk worms. To these may be added sixteen others in which this cultivation was carried on, but on a limited scale and in a precarious manner. Now, however, forty-two new departments have taken up this profitable employment of time and capital; so that we have sixty-four out of eighty-six departments clothed with mulberry trees, and producing silk in greater or less quantities. The present silk crop of France is said, on good authority, to be worth 160,000,000 of francs."

It is evident that the silk business holds out great inducements to the American people; and many years may not elapse before we may find it a source of great profit to our country. If we recollect from how small beginnings the cotton culture has risen to its present state, this will not seem at all incredible or surprising.

A curious application of silken rags is stated in the following extract from an agricultural journal:

"A late number of a French paper (the Quotidienne) states that, through the researches of the learned and much respected Professor Debzenne, the most useless portions of silk can now be transformed, through that gentleman's chemical *palingenesia*, into new silk again, to serve for different articles. In the same way that caoutchouc is drawn out into filaments, and woven into a durable material, so are these remnants of silk reduced to what is no more than its primitive state, (viz: a glutinous paste,) by means of a dissolvent; and, like fused glass, reacquires, oncoming into the air, all its original strength and tenacity. Having found the best dissolvent of the caoutchouc, (the distillation of this elastic resin,) Professor Debzenne was not deceived when he thought that he could also distill silk, which he found to be the true medium for its dissolution. The crude silk, and that which is not dyed, was easily managed. The inventor at present has found no difficulty but with the dyed portions of silk, and more especially the black ones; but he hopes, by continuing his close attention to the subject, to overcome this difficulty, and to relieve France from the duty of 70,000,000 francs which she pays to the foreigner for the means of alimenting her numerous silk establishments. We may certainly look upon the invention as one of the most valuable of the present century."

The estimated crop of silk for 1844 is 396,790 pounds of cocoons.

SUGAR.

Compared with the previous year, the sugar crop of Louisiana has been a large advance on the crop of 1843. Though confined to but a single State, it is not always easy to ascertain in sufficient season the amount of the crop, so as to avoid the error of wrongly estimating. The crop was put at what was supposed to be a fair conclusion, from the various accounts which

reached us; but the season proved more propitious than was anticipated, and the amount received was larger than had been estimated, and even exceeded the most sanguine hopes. Our estimate was consequently quite too low. We have made a corrected estimate by the returns of that year as actually known, the basis of the present estimate in the table for 1844; so that it is consequently much larger than the mere per centage itself of increase on the tabular estimate of 1843 would have required. Great injury is now stated to have been recently suffered by the frost, by which the crop will be lessened from 10,000 to 15,000 hogsheads. The various notices by which we may trace the progress of the crop, as we have been able to gather them from the public journals, are as follows. We regret that but one or two agricultural papers contain any mention of this crop, being most of them published at a remote distance from the sugar region.

"*The coming sugar crop of Louisiana.*—A letter in the Courier, dated New Orleans, June 1st, says: 'The sugar crop is unusually small for the season; and if the Mississippi river don't stop rising very soon, it will doubtless reach and destroy many of the large sugar plantations. The crop just closed was 50,000 hogsheads short of the year previous. The West is about 20,000 hogsheads short of the supply they took last year; they have been buying from hand to mouth, hoping to starve out the holders, but they have at last concluded to come in and take their supply.'"

"*The sugar crop in Louisiana.*—The New Orleans Tropic, of a late date, says: 'We understand that the cane is in the most flourishing condition in all parts of the sugar districts. A friend of ours, who has lately returned from a tour in the adjacent parishes, informs us that he has never seen the cane so abundant and so luxuriant. In the parish of Plaquemines, he has seen cane 16 feet high, and voluminous in the extreme. Mr. Peter Rapp, a well-known planter there, has intimated his intention to commence rolling from the 3d to the 5th of the ensuing month.'"

Again: "The last Concordia Intelligencer says that it is admitted that the plantations on the Mississippi never looked more beautiful than at present. The sugar cane is, without precedent, good; and the crop expected this year is one-third more than has ever been made in Louisiana. The cotton, also, looks well."

"I never saw sugar crops look finer than they do in Louisiana, on the Mississippi river. In many fields the cane is higher than a man's waist. If no casualty happens to it before maturity in the autumn, it will be the largest crop ever made in the State."

We find the following extract, also, in the Planters' Banner of August 3, 1844:

"*The crops.*—The cane, from all that we can learn, is unusually forward in this parish—quite too much so; for, owing to its size and the moisture of the land, the late heavy rains and high winds have prostrated it in many places. We would impress upon the minds of planters the importance of being prepared early for the rolling of the crop this season. Much better lose something by commencing early, than to risk the loss of half a crop by the frost."

In the same paper, of a later date, is a less flattering account.

"*The sugar crop.*—The last Planters' Banner, published in the town of Franklin, Louisiana, has some speculations on the present growing crop of sugar, from which we extract the following:

"'Whatever the prospects may be in other sections of the State of an

abundant yield of sugar, they are not by any means flattering in this cane-growing region. In this parish, the crop on the Teché, which is most important, is unusually poor, owing to the rains which prevailed throughout the months of June and July, and interrupted cultivation. The crop on the Bayou Sale, Berwick's bay, and Bayou Bœuf, we understand, is good; and so is the crop in Lafourche. The danger of frost and other vicissitudes renders it altogether impossible to judge at this season as to the probable product.'"

Again:

"*Louisiana sugar crop.*—A letter from New Orleans, dated the 29th of October, says: 'The crop of sugar is coming in. The calculation is, that it will reach 180,000 to 200,000 hogsheads.'"

The calculation just given is probably too large an estimate. We take as our estimate the following calculation, made by Mr. Degelos; and we think that, notwithstanding recent losses, we may allow one-third of the gain on the crop of the previous year to 1844.

We reckon a hogshead as weighing about 1,200 pounds.

The Planters' Banner of August 3, 1844, says: "Mr. A. Degelos, a commission merchant in New Orleans, has published a statement of sugar made in Louisiana last season, giving the names of the planters in the various parishes. There are numerous errors, but, on the whole, it is about as correct as could be expected. There are six or seven planters set down in St. Mary, who do not belong to this parish; and there are several omitted, who made collectively about 600 hogsheads last year. We give the following recapitulation of the quantity of sugar made in Louisiana in 1843 and 1844. It will be seen that St. Mary stands at the head of the list.

Parishes.	*Hhds.*
St. Mary	15,311
Ascension	10,633
Iberville	9,644
St. James	9,350
Lafourche Interior	6,732
Plaquemines	6,641
Terrebonne	6,366
Assumption	6,256
St. Charles	5,822
St. John the Baptist	5,743
Jefferson	5,453
West Baton Rouge	3,087
St. Martin	2,621
East Baton Rouge	2,334
St. Bernard	2,026
Lafayette	908
Orleans	778
St. Landry	395
Point Coupee	246
Total	100,346

A letter from New Orleans of a later date, published in the National Intelligencer, says: "Our sugar planters have suffered considerably by the

severe frosts within a few days. Fortunately, they began grinding this season very early, so that a larger portion than usual of the crop has been secured; but still the loss is estimated at from 10,000 to 15,000 hogsheads. Notwithstanding this, however, the crop will not be less than 150,000 hogsheads, and many estimate it at 180,000. The price is very low; prime quality from 4 to 4½ cents, and from that down to 3 cents, according to quality."

In the American Agriculturist for December, 1844, we have the following account of an improved method of making sugar by an hydraulic press, which is said to possess some important advantages:

"*Improvements in sugar making.*—We find in some of the late numbers of Simmons's Colonial Magazine, that a patent has been taken out for the application of hydraulic pressure in extracting the juice from the cane. Two presses, each capable of bearing a strain of 1,400 tons, are worked alternately by one set of pumps, which pumps may be worked either by manual labor, by means of double-ended lever handles, or, where manual labor is scarce, by two mules, or a small steam engine of two-horse power. These presses are calculated to turn about 6,000 gallons of cane juice per day of ten hours, which is more than can be effected by a roller mill, even when driven by a steam engine of twelve or fourteen-horse power.

"The advantages of this system of hydraulic pressure are stated to be—1. The juice in the cane (generally 18 per cent. by, weight of saccharine matter) can be wholly extracted; thereby saving about 8 parts now left in the megass. 2. The juice can be rapidly filtered when cold, as discharged from the mill or hydraulic press, if by the latter it should be needful. 3. The tempering can be effected properly and uniformly. 4. The juice can be defecated promptly as it runs from the mill, hydraulic press, or filter; thereby avoiding the deteriorating effects produced by remaining in receivers. 5. The cleansing and evaporating of the defecated liquor (rendered purer by previous operations) can be effected in steam pans, without discharging from one into the other. 6. The evaporated sirup may be decolored and filtered through animal charcoal, which can be revivified on the estate. 7. The final concentration of the sirup can be more rapidly accomplished than by the present mode, in an open pan or trench, at the low temperature of 170° to 180° Fahrenheit, or at about 80° to 100° below the usual temperature of the strike when boiled by the common method. 8. The concentrated mass can be properly crystallized and effectually cured, and the potting avoided, by the use of vessels into which the strikes are discharged consecutively; and the sugar so cured will not drain during the voyage. 9. The molasses can be converted into sugar nearly equal to that of the first production; and sugar can also be made of as good quality, in all respects, as muscovado (and by this peculiar method only) from the molasses that drains from the sugar of the second quality. 10. The megass may be used for manure, if the various operations are performed by the agency of steam. 11. The machinery, apparatus, &c., are simple in their construction and management, and much less costly than others."

In appendix No. 14 will also be found a letter from Mr. Rielleux, of New Orleans, respecting his method of manufacturing sugar, to which allusion was made in a previous report.

Maple sugar still continues to be manufactured in large quantities in many of the States; and the probability is, that it forms a considerable

portion of the supply in many towns in the States where it is usually made. It is said that not less than 10,000 tons are annually sold in the city of New York. The season, on the whole, was a more favorable one for the manufacture of this article in 1844 than in the year 1843; and, in some of the States, a large increase is noted.

In Vermont, which stands foremost among the New England States with respect to the manufacture of sugar, there is some diversity of opinion. In the county of Chittenden, it is said that "the product of maple sugar will not exceed one-half of the usual quantity, owing altogether to the unfavorable season for the manufacture of the article." It should be recollected, however, that there was a falling off, in the year 1843, of not less than 50 per cent.; so that the crop of 1844 was, no doubt, in advance of that year. The whole quantity reported for that county is 88,500 pounds; for Grand Isle, 3,600 pounds. In the other counties there was, it is thought, an increase of 50 per cent. over the crop of 1843, and 10 per cent. over that of 1842. From some of the lower counties our information is, that it is about an average quantity, being four times what was made in 1843, and equal to 1842. From all that we can gather, considering the great falling off the last year, the sugar crop of 1844, in Vermont, was at least 75 per cent. more than that of the year 1843.

New Hampshire also raises a large quantity of sugar, and this is said to be yearly increasing in quantity, and much improving in quality. The year 1843 was a very poor year; and it fell off so much that an equal advance now, as well as in Vermont, should be allowed. We have already stated, at an earlier place in this report, that the figure denoting millions in this crop in New Hampshire, was somehow dropped in 1841, and has been continued so till this time. How the mistake occurred, we have no means of knowing now; but it has been corrected in our table for 1844. We suppose the season has been equally favorable in the other New England States.

In New York a similar increase must be made, as it is variously estimated, in the notices we have gathered, at from 30 to 100 per cent. increase.

In Pennsylvania the crop is thought, for the most part, to have been a large advance on the crop of 1843, which suffered very greatly from the depth of snow, which prevented the manufacture.

From the Western States, with the exception of Ohio, the report respecting the sugar crop for 1844 is quite favorable, and ranges from 25 to 30 per cent. increase. In Michigan it reaches as high as 75 to 100 per cent. One young man in Kent county, it is stated, made not less than 700 pounds from 100 trees.

Some interesting statements respecting the manufacture of maple sugar will be found in appendix No. 15.

Corn-stalk sugar.—We have received a number of communications relating to this subject. A successful experiment on the manufacture of this article was made by Mr. John Beal, of New Harmony, Indiana, who obtained above 300 pounds from the quantity of stalk used—which was about at the rate of 500 pounds to the acre. Some communications on this subject may be found in appendix No. 16. In the same appendix, also, are added some other papers relating to the subject. The letter of Dr. Jackson, and one addressed to him, are important, showing that crystallization can be effected.

It is believed that the results already obtained warrant the conclusion that, as attention is more and more devoted to it, the apparent difficulties

will all be obviated, and the article will yet be manufactured in large quantities.

It is now said, also, that sugar can be manufactured in great amount from potatoes. The statement in an English journal is, that three tons of the raw material will make one ton of potato sugar.

An account of the process will be found extracted from Dr. Ure's Dictionary, in appendix No. 17.

By the following extract, it appears that watermelons have been turned to good account in the production of sirup:

"*Sugar from watermelons.*—Uriah Johnston, a citizen of Carolina, says he has extracted from watermelons a sirup equal to molasses, which would produce sugar of good quality. The sirup is obtained by boiling the juice three hours in a common iron pot—eight gallons making one gallon of excellent sirup. He thinks one acre of common sand hill land would produce watermelons enough to make 200 gallons of sirup equal to the best molasses. The refuse of the melons makes capital food for hogs; and so nothing is lost."

This might be quite valuable in some sections of our country where this fruit is raised in large quantities; still it does not promise to be of very extensive use.

We give a statement here of the amount of *beet sugar* made in France for a year. It will be recollected that the manufacture of sugar from the beet is of comparatively recent date; and this shows what may be expected, should the facts on the subject of the corn stalk be fully sustained:

"The manufacture of beet-root sugar in France, for the year ending July 4, 1844, was 28 millions of kilograms, (325 manufactories,) and the duties levied amounted to nearly five millions of francs."

The whole amount of sugar produced in the United States in 1844, both from the cane and maple, is 201,107,000 pounds.

OTHER PRODUCTS FOR CULTIVATION.

Wine is so little made an object by the culture of the grape, that it is almost impossible to form any estimates respecting this crop; and therefore it has been omitted altogether in the columns of the tabular estimate. The culture of the grape for the table is increasing, and promises to be a source not merely of pleasant luxury, but, in many parts of our country, of very considerable profit.

On a review of the crops for 1844, it appears, that notwithstanding there has been a lessening in some important ones, still there is a sufficiency for man and beast; and our country may yet afford a surplus for foreign markets.

We shall next advert to certain productions of the soil, and connected with agriculture, which furnish inducements to some of our citizens to direct to their cultivation a portion of their enterprise.

In the last report some mention was made of *madder*, as offering inducements to some of the agriculturists, in sections of our country to embark in the enterprise of its cultivation. It is believed, that the more the attention is turned to it, the more feasible the project will be regarded. There is a very considerable demand for it abroad. The prices for madder, according to a late price current in Liverpool, ranged from £3 to £4 per cwt.; and for madder roots, from £4 8*s*. to £4 10*s*. There are some parts

of the country to which this product is well adapted. In a late number of the Southwestern Farmer, we find a communication, said to be from a gentleman of respectability, who speaks of having met, in New Orleans, a German who had come to this country with the express purpose of raising madder, and urging some one to enter upon the experiment. The statement is therefore made, from this experienced individual, that in any part of Mississippi 3,000 pounds per acre of dried madder, or madder fully prepared for the market, could be produced. This, at 15 cents per pound, (the minimum rate in New York or Boston,) would produce $450, in three years, to the acre, and $4,500 for 10 acres. In appendix No. 18 we have a full account of the mode of cultivation, the kind of soil adapted to it, and such other remarks as may be useful, taken from an agricultural journal. In Burger's Manual of Agriculture, we find it stated that, according to the experiments made by Messrs. Von Moro, at Victringen, in Carinthia, during the years 1835 and 1836, the common opinion, that one year's roots will not color so lasting or dark colored a red, is not correct. In Avignon, the roots are suffered to remain in the ground two years; in Holland, England, and the East, three. He also mentions that, in France, madder is sometimes cultivated for 12 to 15 years, successively, in the same field. In the Transactions of the Agricultural Society of Carinthia for 1834, 1835, and 1836, Messrs. Von Moro have given an account of their mode of culture of madder, which, Burger says, deserves the attention of all cultivators of the article. We translate here a few sentences of Burger's description of the same:

"They take up the roots every year, at the end of April or the beginning of May; because, in this experiment, though they obtained less weight of root at a time than by two years, yet, in the two successive yearly gatherings, they secured more."

In Veit's Husbandry, also, another German work, we find it stated that the cultivation of madder is best conducted in a moist, warm climate, and those regions where flax and hemp are most successful; the soil should be moist, loose, and a strong loam. He recommends that, in the first year, while the plants are small, the wide spaces between be used for the culture of low beans, and other vegetables which do not grow to any great height, and so will not impede the growth of the madder.

The report of M. De Gasparin to the French Academy of Sciences, on this product, is said to have effected quite a revolution in its successful culture. We subjoin, also, in appendix No. 18, some extracts from this document, published in a circular of J. M. Thorburn & Co., of New York, who say they have a large quantity of choice seed. M. De Gasparin's observations apply better to France, where labor is low, than to our own country. Still, it is useful. Some madder seed will form part of the seeds to be distributed this season from the Patent Office.

Another product, which deserves more attention than has yet been given to it, is *mustard.* The demand for mustard seed is large, and the price it commands is sufficient to remunerate the expense and labor of raising it. We have endeavored to obtain some estimate of the quantity imported; but there are no returns of the same in the reports of the Treasury Department. An informant, however, furnishes us with the following conclusions. He says that the amount used is probably as much as there is of Sumatra pepper, especially when the fact is taken into consideration, that mustard is used for the sick, also, in the form of sinapisms and baths

He allows, however, that, for the table, there is only one pound of mustard for two pounds of pepper; and then the amount is quite large.

Mustard seed is now principally imported from England and Holland. Recently, some lots have come from the south Pacific, in whale ships; but, from the samples, it is said that this article is not good in its quality. The English manufacturers have recently been supplied, to some extent, with seed from Calcutta. A manufacturing house in this country, from whom we have principally derived our information, tell us that they have seen but two lots of Calcutta mustard seed, both of which were injured by being shipped too green, and heated in the voyage. From a late price current, it appears that white mustard seed is most in demand, and commands the best price abroad. This, it is stated, has not been the case for a number of years before. The market, it is believed, will bear a very considerable increase of production, and yet the raising of the article prove profitable. It is also stated, that if the manufacturers could rely on a supply of the seed—even if it were one cent per pound, or fifty cents per bushel, over the cost of importation—no orders for foreign seed would be sent out. The American seed is thought to be so much superior to the English, that it is believed, were it once tried, it would be preferred even abroad; and the opinion is expressed, that the demand would rather exceed the production than the contrary. In appendix No. 19 may be found some further information respecting this product, mode of culture, &c., taken from the Farmers' Cyclopedia.

We have likewise subjoined in the same appendix, from the Farmers' Cabinet and Ohio Cultivator, accounts of a crop of brown mustard raised by J. H. Parmelee, of Ohio; which shows that, if properly cultivated, it may prove profitable. A further letter of Messrs. Fell & Brother, of Philadelphia, may also be found in appendix No. 19. These gentlemen, from their situation as manufacturers in a large city, are well qualified to judge correctly on this subject.

A crop to which the attention of portions of the Southern country may yet be profitably directed, (as it formerly was,) from the over-production of cotton, is *indigo*. This article commands a good price in the market, and considerable quantities are imported every year, to supply the consumption of this country. Formerly, it was an article of export; and but for the increased attention to cotton, it is probable the quantity now raised might be large. In order to aid in the object, should the attention of any, whose lands and climate are well adapted to its culture, be turned to its cultivation, we have subjoined, in appendix No. 20, some extracts respecting this product, from the Farmers' Cyclopedia.

It is said that our common garden purslain will also furnish a good dye, which may answer the same purpose as indigo. As this plant abounds in many sections of our country, it may be useful to add here the recipe which we find for this purpose in some of our agricultural papers, where it is said to have been furnished by Mr. L. Ellsworth, of Napierville, Illinois:

"Take two bushels of purslain, (*portulacea*,) known as "pursley," add a sufficient quantity of water to cover it when pressed down into the kettle, and boil until thoroughly cooked—then strain off the liquor; also, one pound of ground logwood, boiled separately; dissolve one-quarter of a pound of alum in a sufficient quantity of water to cover four pounds of wool or cloth; then boil the wool or cloth in the alum water two hours;

then add the purslain liquor and the logwood, and boil two hours more. When the article is first taken from the dye, it will have a purple hue; but will soon turn to a handsome blue on being exposed to the air. The quantity may be increased or diminished as required, observing the above proportions."

Spurry is much thought of in many parts of Europe, and this product may deserve the attention of our agriculturists. We have already given an account of this article in the report of 1843; and will merely here repeat, from that description, the remark of Von Thaer, the great Prussian agriculturist, that, in proportion to its bulk as hay, or cut green or in pasture, it is the most nourishing of all forage, and gives the best flavored milk and butter. Some of the seed of this plant has been procured for distribution, and it is not improbable that this may be the means of introducing it into culture in this country.

Clover is recommended in some of the agricultural papers as a product which, to a limited extent, will furnish a profitable crop when raised for seed. It is stated by one person, that, at four dollars a bushel, it will afford a better profit than any kind of grain. The mode of raising seed from the *large* kind suggested, is to pasture it till about the middle of June, then sow on some plaster, and mow as soon as three-fourths of it is ripe. By thus mowing it early, more seed is said to be got from it than if it is left to stand till it is fully ripe; because, in this latter case, a quarter of the seed is lost in gathering. For the *small kind* of clover, it is recommended to mow it from the 20th to the 24th of June, and then plaster immediately after the hay is off. The second growth will give good seed. Many farmers gather their clover seed early, and sow the sod with wheat the same fall. This is considered in many cases a good fallow for wheat.

In appendix No. 28, some account may be found of Italian rye grass, which might be useful in parts of our country.

Millet would likewise do well in some soils. We insert here a short extract, from a good authority, relating to this product, as it may perhaps be useful to some:

"June is a good time to sow millet. It will do well sown any time in the month. It makes, when well cured, excellent fodder. One of the general advantages of this crop is, that if the hay crop is likely to come in light, this may be grown as a substitute. Half a bushel of seed broadcast to the acre is a proper quantity, though only a peck is sometimes sown on rich ground. It may, if desired, be sown in drills; and if designed for seed, this is the best way. A common turnip drill will sow the seed well. It will yield bountifully; and the seed, when ground into meal, is excellent for fattening animals. Rather light ground is best for it; it will, indeed, do well on land that is too light for grass. In 1841, Mr. G. Jones received a premium from the Tompkins County Agricultural Society, for having raised on two acres five and a half tons of millet fodder, and sixty-three bushels of seed. It was new land, the wood and timber from which was taken off in the month of April, and twenty quarts of seed sown to the acre the 8th of June succeeding."

A writer in one of our agricultural papers mentions *coffee* as a fruit that may deserve a trial in some of the Southern States. He speaks of a coffee estate which he saw just before entering the city of Caraccas. The coffee trees, he says, were planted in rows of ten feet from each other, under a

tree with an umbrella-like head, called the buccaris, which were about thirty feet apart. In the West Indies, the banana, or plantain, are usually planted on the sunny side of the coffee tree, to shade it from the fierce heat of the sun.

The cultivation, he adds, is simple. It is said to flourish well on the Jamaica mountains, at a height above the sea where the climate is quite as cold as South Carolina, Georgia, or Louisiana ; the labor is also very light. The tree, when once planted, will bear thirty, and sometimes fifty years. The preparation for market, too, is very simple, and may easily be performed by children. When ripe, it is picked ; then carried to a platform which covers sometimes an area of several acres, made of plaster, very hard and dry. There the berries are spread out in the sun to dry ; after which, they are placed in a mill resembling a cider mill, where a heavy wheel passes over them and takes off the husk ; it is then cleaned by a common fan, and placed in bags for market.

It is an interesting question, whether it will bear the climate of the Southern States; for, (says the writer whom we are quoting,) if so, there can be little doubt that, for productiveness and facility of culture, it will be preferable to any Southern crop. It is to be hoped the trial may yet be made, and thus the question practically decided. The addition of coffee to our home products would save to our citizens a large amount of money which is paid abroad for the same. According to the statement of foreign imports for nine months ending 30th of June, 1843, the quantity imported amounted to about 93,500,000 pounds, at a value of about $6,500,000.

It is not difficult to procure the seed ; and, when once the fact is ascertained that it can be raised, we can have no doubt that it would become a favorite object, and divert much capital and labor from cotton raising ; thus rendering that product more valuable.

Many of the *root* crops admit also of more extensive cultivation. Large quantities are already raised for the feeding of stock ; but their full value is not yet sufficiently realized. We observe, in collecting various information from the agricultural papers, that splendid crops are noticed, showing what our farmers might do, with proper care. Some of these products may be rendered valuable for other uses than for feeding of animals or the supply of the table. The sugar beet, it is well known, is employed in great quantities for the manufacture of sugar in France. It is said likewise to furnish an excellent vinegar, with very little trouble. A writer in the Detroit Farmer says : " The last season I grated about a bushel of the sugar beet to a fine pulp, and pressed the juice therefrom, of which I obtained six gallons. I put the same in a vinegar barrel which was entirely empty, and in less than two weeks I had as good and as pleasant vinegar as I ever obtained from cider, and was equally as strong and clear."

The year 1844 has been one peculiarly distinguished for the product of *pumpkins, melons,* and similar fruits. They have been raised not merely in large quantities, but also of rare excellence. Many reports have reached us, and have also met our notice in the agricultural journals, of admirable crops of this kind ; and although they can never form a primary crop, or be substituted as a succedaneum for the more important field products, yet they may not be altogether unworthy of mention, as they form often a valuable aid to the farmer, when, by some unforeseen cause, he is compelled, in some measure, to resort to them.

One gentleman from Schoharie county, New York, writes us that, on 3

acres of corn ground, where he planted pumpkin seed with the corn, besides the good yield of corn which he harvested, he also gathered over 4,000 pumpkins, averaging 10 lbs. each—making 40,000 lbs., or nearly 7 tons to the acre; which would prove valuable feed for stock, particularly milch cows, for which purpose he considered them superior to any thing else.

In a public journal in Massachusetts, it is stated that a gardener in Worcester raised from a single seed 15 pumpkins, weighing 384 lbs. The largest weighed 31½ lbs., and the average of the whole was 25½ lbs. each. The vine, including all its branches, measured 635 feet in length.

A great desideratum with respect to this and similar fruit, is, to obtain the best method of preserving it through the winter. Its value as fodder may thus be much enhanced, as it may save, in some degree, more costly food.

The following is a method said to have been given at a meeting of the Farmers' Club, in New York: A pumpkin, the growth of the year previous, was presented by a farmer from Red Bank, who remarked that he had found it an easy matter to keep them through the winter, and had nearly succeeded in keeping them two years. He directed to select only the dead ripe ones to be preserved. These should be carefully laid on the bottom of a cart, and carried to a shed having a southern exposure. On the bottom of the shed must be a layer of rails, and then a layer of pumpkins. When this is completed, then it must be built up with another layer of rails, so placed as not to press on the pumpkins; and so on, till the shed is full. Let the pumpkins remain here till you are afraid of their freezing. As soon as this is the case, they must be taken to the kitchen, and put on shelves nailed to the cross beams.

In connexion with the subject of this species of fruit, we subjoin the following mode of raising cucumbers, which is stated to have been fully tested, and found preferable to any other, especially when the season is dry:

"An excellent mode of raising cucumbers and melons, is to dig out a space (say) 6 or 8 inches deep and 3 feet across; place an old keg (nail cask or any thing of the kind) with both heads knocked out, in the centre of the excavation. Then fill the space around the tub with compost made by mixing good loam with manure from the hog pen, hen roost, or stable, (the former are preferable;) cover it over with two or three inches of earth, and plant the seeds near the tub; fill the tub or cask with some light kind of manure or muck that will hold water like a sponge. The advantage of this is, that, in case of drought, water may be turned into these tubs by the pail-full, and the light manure will prevent it from going off too suddenly, but will give a gradual supply to the roots as they require. The casks should be open between staves, or else holes must be bored in them, to let the water soak through. If the ground is inclining to be wet, no excavation should be made; but the cask should be placed on the top, and a little mound made round them by the manure and earth. To give a chance for the vines to run, the casks ought to be about 8 or 9 feet apart."

We subjoin a somewhat similar account of a method tried and proved, received from one of our correspondents in Massachusetts. It is, "to raise watermelons on waste sandy lands."

"Dig holes about 8 or 10 feet apart, of sufficient size to contain half a bushel; the depth should exceed the diameter. These holes fill with rich compost, (the best is that obtained from the hog pen,) and there deposite the seed. Should it be a dry season, it may be necessary to water the hills occa-

sionally until the plants appear; then they may be neglected to almost any extent. The vines will cover the surface, and the action of the sun on the sand will prove highly beneficial to the melon. Melons produced in this manner ripen, and are as good as those raised in heavier soil."

We have several valuable communications relating to different vegetables; some of which we shall throw into our appendix, as they may prove useful to a portion of the agricultural community. One of them relates to the *okra*, the seed of which, it is said, will form an excellent substitute for coffee, when burnt and ground in the same manner practised in the preparation of that fruit for a beverage. Some account of this vegetable may be found, together with Mr. Callan's letter inviting attention to the same, in appendix No. 21. The seeds are said to be abundant, and the plant easily raised.

A valuable account of the mode of raising *celery*, a favorite garden plant, has been furnished us by Junius Smith, Esq., of New York, who has tested it by many years' trial; and who (as it will be seen in his letter in appendix No. 22) confidently recommends it, as deserving the attention of those who wish to obtain the choicest specimens of this garden vegetable.

We have formerly mentioned *artichokes* as a vegetable which would be very profitable to many of the agriculturists of our country. This product has long been known and most highly prized in Germany; and the writings of some of the first practical agriculturists there, (as Thaer, Schwertz, Burger, and others,) abound in strong commendations of their excellence as a fodder for stock, and especially milch cows.

It would appear, from some notices which have met our view in the agricultural journals, that artichokes are beginning to be somewhat more cultivated by our farmers. The following statement we derive from one of these valuable periodicals, the Cultivator. The facts mentioned deserve consideration.

"Several trials which we have known made with this root indicate that it is one of the most valuable for stock which can be cultivated. A few years ago, a gentleman of our acquaintance planted a small patch of rich ground with them. The produce was at the rate of 1,200 bushels per acre. They were principally harvested by hogs, which were turned in, and allowed to root them up as their appetite prompted. They gained well, with no other food, while the artichokes lasted. A great advantage of this root is, that it will lie in the ground without injury all winter.

"Mr. Thomas Noble, of Massillon, gave us a brief account of a trial with artichokes, made by him the past season. In April, 1843, he planted two acres with this vegetable. The ground was of medium quality. The artichokes were planted in rows 2½ to 3 feet apart—using a little more seed than is commonly used in planting potatoes. As soon as the frost was out of the ground last spring, (1844,) the digging of them was begun, and continued as the stock required. The produce of the two acres was 1,500 bushels. They were fed principally to sheep, though some were given to cattle, horses, and hogs. All animals ate them well, seeming to prefer them to turnips. While the sheep were being fed with them, they were pastured on growing wheat and clover. The shepherd thought the wheat and clover were sufficient for them, as there was a full 'bite,' and he accordingly discontinued the artichokes. The ewes 'fell off' in their milk, and the lambs soon showed that they were not doing so well. The artichokes were again given, and they soon did as well as ever.

"Mr. Noble also used the *tops* for fodder. He cut them in October, just

before frost came, dried and housed them. They were fed to the stock in winter, and were evidently preferred to corn fodder.

"Mr. N. is so well pleased with artichokes, that he is raising them this year on a larger scale. They require but little cultivation it; being only necessary to keep the ground clear of weeds till the artichokes get a good start.

"Mr. T. M. Johnson, of Greensborough, Alabama, lately informed us that he is this year growing 30 acres of artichokes. He considers them the most profitable vegetable he can raise. In that climate, they can be dug any time in the winter.

"There are several varieties of artichokes, but that called the Jerusalem artichoke (*helianthus tuberosus*) is considered best. From the fibres of the tops or stems, a cordage is sometimes manufactured in some parts of Europe."

The introduction of the *turnip* into Great Britain was gradual. Lord Townsend, who led the way in the enterprise of its culture, had the nickname of the vegetable applied to him, by the wits of the day at the Court, and went by the name thus of "Turnip Townsend;" but it is said that, by the culture of this root alone, not less than £60,000,000 has been added annually to the value of English agriculture. Facts like these should be borne in mind by those who essay experiments on new products, which promise, if successful, to be a source of great benefit to their country. We should not be surprised if, in the course of years, the value of the artichoke should be fully realized, though few, at present, seem to turn even a passing thought to its admirable qualities.

Large quantities of *apples*, and other fruits of the orchard, have been raised during the past season. It is found, however, that, owing to premature ripeness, or some other cause, it has been more difficult than usual to preserve them from early decay. As apples promise yet to become an article of export, it may be useful to give here the following method, which is said to answer well, for preserving them. It is stated in one of the public journals, on good authority, to have been successfully tried in northern Indiana. It is, at least, a simple plan, and easily tested. The writer remarks, as from his informant, that, to keep apples from autumn to June, they should be placed in a shallow hole, dug as if for potatoes; the bottom is first covered with corn stalks or straw, and then the straw with dirt, five or six inches more. No shelter is to be placed over them. When the severe weather commences, and the ground, and perhaps also the apples, are thoroughly frozen, place straw over the frozen heap, and cover the whole again with a coating of earth 10 or 12 inches thick. The object of this is to keep the first coating of earth frozen till spring, and then to cause it to thaw very slowly. It is stated that Irish potatoes, beets, carrots, and turnips, may also be preserved in the same manner. Any of these roots may be thoroughly frozen without injury, provided they are well covered over, and then suffered to thaw by slow degrees. Sweet potatoes cannot be so treated with success, as they suffer injury from a small degree of cold. The common potato, or apple, that has been frozen, decays in consequence of sudden thawing; but if they are put in a frozen state into cold water until the frost is expelled, and then are used, they will be nearly, if not quite, as good as if they had not been frozen.

A great variety of fine fruits are produced in this country, and the excellence of various kinds is continually improving by cultivation. Grapes of the native species, and others, are found in abundanee in the markets of

many of our cities. A number of French emigrants, it has been stated, are about to fix themselves in North Carolina, to cultivate the native grape there, for the purpose of manufacturing wine; and they say, after examination, that they believe, by age, it will prove equal to the best kinds of wine which it resembles from Europe.

One would hardly suppose that such vast quantities of *strawberries* were sold, as the result of examination in some places shows to be the fact. Thus the Cincinnati Atlas says:

"It is estimated that the market has been supplied with one hundred bushels of large delicious strawberries daily, for three or four weeks past. The raspberry is now succeeding the strawberry in about the same quantities, and the blackberry will succeed the raspberry in the like profusion. There are strawberry patches in the neighborhood containing about twenty acres, cultivated by a single individual; and gardens of the same size devoted to the raspberry. These berries sell at the stalls in the market at five to ten cents per quart. They form a standing dish on most of the tables of the wealthy and middle classes; and none so poor but they are more or less supplied."

"A late committee from the Horticultural Society of that city, appointed to ascertain the statistics in relation to the growth and sale of strawberries in Cincinnati and its vicinity, has reported that, in pursuing their investigations, they had found in the market, during one day in the last week of May, 235 bushels of this fruit; and this was exclusive of the large quantities bought by the hotels, and also of those brought into the city after market hours, and hauled about the streets."

Bark has heretofore been mentioned as an article which might become a profitable product in some sections of our country. Numerous attempts have been made to reduce the tannin, or coloring principle which it contains, into such a compact state that it might be more readily transported, and bear the expense of freight; bark itself being so bulky that the freight from our country to European markets would prove too great to justify its exportation, and, in some degree, also prevent its being carried, for sale and home use, to various parts of the country. A mode has at length been adopted, to obtain a precipitate, and thus concentrate the good properties of bark in the form of a dry cake, resembling in appearance the yellow ochre. Experiments which have thus far been made on this subject justify sanguine expectations. Should no disappointment in relation to it arise, in the future efforts to be made in completing these experiments, the discovery will prove of great value, especially to the western section of our country, as the settlers there will be cheered to find a new motive given them for clearing their lands of the heavy timber. Bark, at Philadelphia and in the seaports, sells for $8 per cord; while at the West it is worth only from $2 50 to $3. In another year, further information can doubtless be given on this subject.

We have a few remarks to add to the suggestions contained in the former report, with respect to the products of the *dairy*.

In the preparation of butter, much must depend on the quality of the salt which is used. Even the purest salt of commerce, it is stated, contains small quantities of sulphate of magnesia and lime, nitrate of soda, and muriate of magnesia. This is the case with rock and bay salt, which is considered altogether the best to be obtained; and that which is commonly used, not only contains a portion of these substances, but likewise other

impurities, which greatly impair, if not destroy, its efficacy. The following direction is given on high authority, as a mode by which, at little trouble or expense, any farmer's wife can render the salt she uses pure: Put into a large kettle a peck of salt, with clear rain water enough to dissolve it; boil it, and skim off every particle of scum that rises on the surface; then dissolve one ounce of the carbonate of soda in four ounces of water, put it into the kettle, stir it well, then boil it again for ten minutes, skimming off the scum that rises; then strain the brine through several folds of flannel. A considerable quantity of earthy matter will thus be found in the bottom of the kettle, which is the cause of the impurity. After having thus strained it, add a small quantity (half an ounce or so) of muriatic acid to the brine, to neutralize the soda; then put the brine again into the kettle, and boil it till it crystallizes, or in a shallow wooden vessel till the water is evaporated: the first is the quickest. After the salt is well crystallized, it must be washed, by putting it into a clean basket, and throwing over it a bucket of perfectly pure water, and let it drain off rapidly; then let it be dried. Perfectly pure salt can thus be obtained, suitable not only for butter, but for preserving meat, &c.; and the increased excellence thus secured will well repay all the trouble and expense of preparation. It can be rendered more pure than is usually bought, indeed, if the carbonate of soda should not be added; but it is still better when it is also used.

In some of the public journals the following method of sweetening rancid butter has been published, as taken from some foreign work. It is one which deserves more thorough trial, as the evil to be remedied is one of considerable magnitude. We give it as we find it in the American Agriculturist, under the head of "foreign agricultural news:"

"An agriculturist in the neighborhood of Brussels having succeeded in removing the bad smell and disagreeable taste of some butter, by beating, or mixing it with chloride of lime, he was encouraged by this happy result to continue his experiments by trying them upon butter so rancid as to be past use; and he has restored to butter, whose odor and taste were insupportable, all the sweetness of fresh. This operation is extremely simple, and practicable for all; it consists in beating the butter in a sufficient quantity of water, in which put twenty-five or thirty drops of chloride of lime to two pounds of butter. After having mixed it till all its parts are in contact with the water, it may be left in for an hour or two, afterwards withdrawn, and washed anew in fresh water. The chloride of lime, having nothing injurious in it, can with safety be augmented; but, after having verified the experiment, it was found that twenty-five or thirty drops to two and a half pounds of butter were sufficient."

It is stated, that the trouble of churning may be saved by the adoption of this plan: Tie up the cream in a linen cloth, and place over it a piece of calico or print; then bury the whole in a damp place in the garden for twenty-four hours; then take it up, and turn the cream (which is by this time of the consistency and shape of a pudding) into a bowl, and stir it with a wooden spoon, and the butter will quickly separate from the bultermilk; and, it is said, it will be sweeter than that which is made by the ordinary method.

We have noticed, in the course of the year, the record of some fine dairies. We give, as a specimen of what can be done in this branch of agricultural industry, the product of Mr. Brainerd's dairy, in the town of Western, State of New York. From sixteen cows, in one season, he made one hundred and seventy-six pounds per cow, besides the supply of a family of six,

and, much of the time, seven or eight persons. This (remarks the editor of the agricultural journal from which we derive the facts) would probably raise the quantity to between one hundred and ninety and two hundred pounds. There was no extra feed, besides grass and hay, except one hundred and fifty pumpkins in the fall.

In the making of cheese, it is said, that if the curd is not scalded, the aromatic oil, which rises to the top, and runs off in the whey, is retained; but also the cream might thus pass off. The cheeses should be kept in the press for some days, occasionally turning them, till the linen wrapper is no longer moist; when rubbed, it may be with hog's lard instead of whey butter.

The experiments in the preparation of *corn meal, &c.*, by kiln drying, have been completely successful. Mr. Gill, whose letters were given in the last report, informs us that he manufactured it both of flour and meal, and held it in the South for the summer and fall markets, and that every barrel remained as good and sweet as when made. The flour was sold at $5 to $6 per barrel; the corn meal at $3. His agents at New Orleans wrote him, on returning the account of sales, congratulating him on his bright prospects for the next year; assuring him that in both, but especially in the latter, he had established his reputation beyond any thing he could imagine; and they did not care how much he sent them, as they could sell it both for city consumption and shipping purposes. No injury was experienced, even in the samples first sent the previous year; and the opinion is confidently expressed, that it would continue so for years. A half barrel of the flour made in 1843 will probably be received at the Patent Office, to remain for exhibition some two or three years. Some of the meal, two years old, remains as good as when first put up, as may be seen by a sample at the Patent Office.

PREPARATION OF SOIL, SEED, &c.

In a glutted market, and, consequently, a poor demand of any great staple, there is a necessity for a change of crops; and, lest a common selection, by many, of the same crop should not lessen the evil, it will be advisable to diversify the crop, so as to raise, as far as practicable, all that is consumed on the farm. On this selection and diversity of crops, much, *very much*, depends. Until lately, cotton planters have purchased all provisions and clothing, and raised nothing but cotton. This course has been partially changed, and will be more so without delay. At the present low prices of cotton, with no improvement in market, it is evident that an exchange crop of this article, especially if competition continues, must fail to remunerate the planter.

While, however, the selection of new crops is recommended, great care must be taken that no crops are attempted but such as are suited to the soil. If the soil will not admit of a change to the desired crop, it must not be attempted. If possible, the soil should be examined; and this is easily done by analyzing the same, and finding the component parts. It would be useless to attempt raising wheat on sand, or Indian corn on clay. Land that is cold or wet may produce grass, but will not produce grain without draining. It is impossible to lay down any positive rules, while we judge only from the *appearance* of the soil; since some rich soils contain too much acidity, and land that might not exhibit to the eye any lime might contain, in some chemical solution, enough for wheat. So of humus: this may be estimated more accurately by the eye; still, an analysis is better.

The eminent Thaer very justly lays down the proposition, that, in exact

proportion to the amount of acidity, is the decrease in the value of the soil and this goes on from bad to worse, till the soil is no better than what we commonly call marshy land. Some extracts from his Principles of Agriculture (a work hardly known in this country, but which is a standard one in Europe) will be found in appendix No. 23. These imbody some of his valuable remarks on soils, and means of correcting their defects, &c., and, we doubt not, will be found very useful to the agriculturists who may read them.

The attention of the public has recently been directed to the question as to the quantity of seed which should be employed, and the best method of sowing it. An interesting paper on this subject, taken from a foreign journal, on the injury and waste of sowing corn or grain too thickly, may be found in appendix No. 24. Mr. Hewett Davis has there furnished some valuable hints, which deserve consideration, as he plainly shows that much seed may be saved—amounting, as he calculates, for Great Britain, to an annual saving of 1,328,507 quarters, or 10,628,056 bushels; or 73,774 quarters more than the annual average of foreign importation of grain for the last 14 years. His essay on the subject is evidently the production of not only a practical man, but a sound judge of agricultural subjects.

Some mention was made, in the report for 1843, of modes of raising crops by a new process of applying the means of fertility directly to the seed itself, in form of steeps. As this has become a matter of deeper interest, in consequence of the theory being apparently admitted by eminent scientific writers, we have subjoined at this time, in appendix No. 25, several interesting papers, which we have taken from various sources, and which throw much light on the history of the discovery, and methods adopted for the purpose. They will be read, we believe, with much interest, by those who have not before seen them.

We have given, in appendix No. 26, a statement relative to the time of the vegetation of seeds, which, allowing for the difference of location, and thus of climate, may prove useful in conducting experiments and carrying on observations in relation to some of the fruits of the earth.

Other steeps are also mentioned in the agricultural and public journals, which are more or less commended. Among these are Hauterive's chemical, said to have been tried successfully. It is stated that he received the gold medal and the sum of 3,000 francs of the Society of Encouragement, &c., at Paris, for this preparation, after a report to the society made in the year 1843, by a committee composed of four chemists and four agriculturists, who tested the process for three consecutive years. It is said to be sold at Baltimore, by F. W. Sweeny, for $3 per half-barrel of sixteen or eighteen gallons, with full printed directions how to use it.

Besides the preparation of seeds, various expedients have been resorted to, to promote the fruitfulness of crops, either directly acting on the plant or on the soil. Some of the most curious results thus produced are those which are recorded as having taken place on the application of electricity or galvanism. Although, in the present stage of this means, it does not admit of any extensive use, yet it is not impossible that valuable conclusions may be drawn respecting the theory of vegetation, and hereafter something more practical may be realized. The account of these experiments (one by Dr. Foster, the other by William Ross, Esq.) may be found in appendix No. 27.

The choice of seed is a subject which deserves much attention. Crops may be rendered more sure and productive, and also often earlier, by a careful selection of seed at the proper time. A practical agriculturist, fo

three successive years, planted seed corn taken from within an inch of the butt-end of the ear; and the result is said to have been, that he obtained a good crop some two or three weeks earlier. It is well known, also, that beans and cucumbers, &c., taken from the lower part of the vines, are best for seed.

The importance of *subsoil or deep ploughing* is not sufficiently realized. It is well known that beneath the upper soil lies yet another, composed of different chemical elements, and in various combinations. It may often be, therefore, that, by bringing up the sub-soil, the very constituents which are deficient in the upper may thus be supplied, or the excess in that may be neutralized by this. The roots of plants extend to great depth. Clover is a familiar instance. The fine roots of this plant may not unfrequently be found in abundance two and three feet, or more, below the surface; and hence the great advantage of this crop to the ground itself. In a late English agricultural paper, a writer says: "In forming a kitchen garden, I had occasion to trench a wheat field, and found that the soil was matted with fibres to the depth of about four feet six inches; but stronger roots extended below that depth, and were traced from five feet to five feet six inches." This applies also with great force to those vegetables which have long tap roots. Instances are recorded of the carrot being raised eighteen, twenty, twenty-four, and even thirty inches long; and were the finely tapering root traced down its whole extent, it would often, doubtless, be found to reach far deeper. It is obvious, therefore, that if the ground be loosened deep, the roots have free play, and the plant will thrive much better. The secret seems to be, to turn up the subsoil; and the deeper the ground is ploughed, the more probable the success. Corn should be planted somewhat deep, and covered light, as, in this manner, the action of the atmosphere may be more easily secured, Numerous examples of experiments proving this might be cited, were they needed. It is probable that the deep planting, as well as deep covering of seeds, has often impeded their growth.

The following is a valuable statement respecting raising of grass, which is taken from an agricultural journal, where it is attributed to an old experienced practical farmer:

"I will take an old piece of herdsgrass, that at present yields less than half a ton of hay per acre; and at the end of five years, without breaking up, fresh seeding, or manuring in any way whatever, I will raise the crop to two and a half tons per acre; and this I will do by merely permitting the crop to stand until the seed will just vegetate before cutting. By mowing the crop sooner than that, the roots bleed and die out; and that is the reason why a second crop does not spring for a long time after. I once purchased a fifth part of the crop of timothy on one of the islands in the Delaware, with the intention of cutting my lot at the time the other four purchasers did theirs; but I was called from home, and it was not done until the seeds would vegetate. I thought my hay was spoiled, but it was preferred to that of all others for horse feed; and, behold, the next year, my lot of land yielded double the crop of the others; and, at the end of five years, it had increased to two and a half tons per acre, having overgrown all other grasses—a uniform crop five feet in height, and preferred before all others at the market. Since that, I have never cut timothy until the seeds will just vegetate; and I would take a poor field that shows only a few spears of timothy growing in it, and, by these simple means, engage in five years to cut two and a half tons per acre of superior hay, provided the land be suitable to the growth of the crop."

MANURES.

The subject of *manures* is more and more engaging the attention of the agriculturists of our own as well as other countries. *Guano* has recently been imported, and a number of experiments have been made during the past year. These all tend to confirm the view which has heretofore been expressed of the extraordinary power it possesses on various crops. In appendix No. 29 we have given some extracts from a letter of Dr. Jackson relating to this subject, as well as a number of other papers relating to manures of different kinds. To Dr. Jackson is due the recipe for an artificial guano, which was published as that of Mr. Valentine, the gentleman who presented it to the Farmers' Club in New York, in the report of 1843. Many suggestions are made in relation to the best method of applying this manure to the soil. We have copied, for the appendix above mentioned, the most complete set of rules which have met our view in any agricultural paper. There is no doubt that the various specimens analyzed exhibit degrees of adaptation for particular soils. The Peruvian is the best. The African is better than some other. It appears to be a necessary condition to its full strength, that the location from whence it is taken be where there are no rains, but continued dry weather; otherwise, certain elements essential to its greatest fertilizing powers are lost or impaired. W. F. Karkeek, an eminent writer on these subjects, in a late essay on manures, says that guano is drilled in with seed. Not less than a ton of earth or ashes should be mixed with each cwt. of guano. The introduction of guano will lead to many useful experiments, and its analysis will induce the formation of artificial guano of various kinds, from materials which abound in our own country. If it were not for this, it might be of comparatively little advantage, since the cost on the seaboard and the transportation would perhaps consume, in a great degree, the profits of farmers of the East, who have now to compete with the fertile soil of the West, where manure is not supposed needful. Some of the rich prairies there have been cropped fifteen to twenty years, without apparent deterioration. While, therefore, the introduction of guano may be hailed as a new era, its advantages will be very limited, and farmers will still have to depend upon rotation of crops, compost heaps, &c. These, with deep ploughing, will always, in a good season, secure a fair remuneration.

The account given by Mr. Schattenman of the cheap and immediate conversion of fecal matter into manure, which will be found in appendix No. 30, and which we have taken from an agricultural journal, deserves consideration. It is by such knowledge that the farmers of our country will gradually begin to understand what a vast mine of wealth they have in the means so easily afforded them of fertilizing their lands, and that it is not so much by tilling a great area of soil, but devoting their information and practical skill to cultivate highly a smaller number of acres, that they are to look for their success.

The nearest approach to guano among us is, doubtless, pigeon dung. It is said that from the use of this, the Persian melon in some degree derives its superiority. Hen dung is, as it is said, also a most excellent manure for melons.

Charcoal and salt have both been used with great effect. The following statement shows the great efficacy of these, in experiments made in England:

"The Earl of Essex gives an account, in the Agricultural Gazette, of

an experiment made by him with charcoal, and charcoal combined with salt, applied to turnip seed at the time of sowing. In the first case, the seed was mixed with twelve times its bulk of charcoal dust. In the second case, the seed was mixed with five times its weight of salt, and nine bulks of charcoal; and in the third case, the seed was put in alone. The ground was very dry and parched, but the seed, where the charcoal and the charcoal and salt were used, came up in five days. The plants where the clear charcoal was used, however, grew much the most rapidly; where nothing was used, the plants came up badly, and, after they were up, did not grow near so fast as the others. The earl also tried the same application of charcoal with the seed of the Belgian carrot, which vegetated several days sooner than carrot seed usually does, even under favorable circumstances. He also sowed one row of turnips with double the quantity of salt above mentioned, which totally destroyed the seed. Nothing but the substances named were used, and the earl thinks that the quick vegetation and rapid growth were attributable to them."

Salt is likewise said to be excellent for plum trees, as appears by the following extract from the Boston Cultivator:

"Mr. Benjamin Jacobs, of Dorchester, had a small plum tree which never bore more than half a dozen plums which came to maturity. Seeing salt recommended as a remedy, in an article from the Cultivator, he applied two quarts the 1st of March, in a space about two feet wide around the tree, commencing about six inches from the tree; it was dug into the ground a little: the consequence has been, a fine lot of fruit. We saw this tree a short time since, and it was as full as it could hold. It is evident that salt made the great contrast between this and previous years, as to the production of fruit."

In the American Agriculturist we have a condensed view of some experiments made by Mr. Hannam, a full account of which is found in the Quarterly Journal of Agriculture, published in Scotland. To this gentleman, we believe, was awarded the premium of fifty sovereigns. The suggestions of the editor of the American Agriculturist are likewise deserving of attention.

"*Experiments with manures.*

"*Nitrate of soda, nitrate of potash, sulphate of soda, salt, and soot.*—We condense from the English Agricultural Journal a series of experiments with the above manures, made by Mr. Hannam, on several kinds of grain, the past season, and detailed at considerable length.

"*Oats*, per imperial acre, over the same kind of land where nothing was applied, gained, with 84 pounds of nitrate soda mixed with 168 pounds of common salt, 5.76 bushels grain, and 304 pounds straw; with 112 pounds of nitrate potash, 4.26 bushels grain, and 304 pounds straw; with 112 pounds of nitrate potash, 4.26 bushels grain, and 280 pounds straw; with 236 pounds of salt, 6.66 bushels grain, and 350 pounds straw.

"*Barley* gained, with 168 pounds of nitrate soda, 14.12 bushels grain, and 572 pounds straw; with 112 pounds nitrate soda mixed with the same quantity of sulphate soda, 11.55 bushels grain, and 432 pounds straw; with 84 pounds of nitrate soda mixed with 168 pounds salt, 10.42 bushels grain, and 600 pounds straw; with 114 pounds of nitrate potash, 11.16 bushels grain, and 714 pounds straw; with 336 pounds salt, 11.42 bushels grain, and 44 pounds straw.

"*Wheat* gained, with 140 pounds of nitrate soda, 5.62 bushels grain, and

424 pounds straw; with 112 pounds of nitrate potash, 4.25 bushels grain, and 316 pounds straw; with 32 bushels of soot, 2.25 bushels grain, and 68 pounds straw; with 336 pounds of salt, 1.4 bushel grain, and decreased the straw 96 pounds; with 140 pounds of sulphate soda, the grain decreased 0.83 of a bushel, and increased the straw 28 pounds.

"The good or ill success of such experiments as detailed above, must always depend more or less on the situation of the land, the elements contained in the soil, and something on the season. For example: if the land be within reach of sea breezes, which for centuries have been supplying it with soda, an application of nitrate of soda would not benefit it; nor would nitrate of potash a soil already containing a sufficiency of potash. It would be the same with lime, plaster, &c., &c.; so that, in making experiments, all these things must be considered. Still, we would not advise the farmer at all times to be at the expense of an analysis of his soil, to see what elements it contained, but would advise him to make a few cheap experiments on a small scale; and if these prove successful, then enlarge them. This would cost him less than a good analysis, and be more certain and satisfactory, as there will be attendant circumstances in all experiments over which the chemist can have no control, and for which he cannot always account."

In appendix No. 31 will be found the letter of Moses Pierce, respecting manure, which may be derived from the remains of leaches or refuse lye. This may be of very considerable importance to many parts of our country where manufactures are springing up, as it may afford the means of enriching the soil, even in the close vicinity of new markets.

The use of lime and ground bones has been very beneficial in many parts of our country in restoring lands. The great difficulty in the application of this latter manure is in the want of suitable mills for grinding the bones. A gentleman, writing us last season in the District, expresses his surprise that no one has established such a mill here, instead of shipping them to Philadelphia. He says, that not being able to procure all he wanted, he has ordered 1,200 bushels from Philadelphia, at a cost of about $40 per hundred. It is not improbable that many of these same bones were shipped from this District. Similar cases may doubtless be found in other parts of the country. In appendix No. 32 is given a communication from Peter Eastwood, Esq., relating to these subjects. His experience is valuable. Bone manure is stated by others to be very useful for pasture of milch cows.

Lime appears to have had a great effect on the land in many sections of the country. It is well known to be of great use for wheat crops. In a report of the Newcastle County (Delaware) Agricultural Society, we have some interesting statements on this subject. It is there said: "The lands have increased in productiveness and intrinsic value at a rate unprecedented, in consequence of the application of this manure; for, notwithstanding the low price of grain, several farms in the vicinity of Red Lion and St. George's Hundreds, within the last year or two, have brought 60 or 70 dollars per acre, where the same lands, 20 years ago, would not have brought more than 15 or 20 dollars, at the most."

Marl has also been tried there with great success. In sections of our country are vast beds of marl, and it needs only a little enterprise for persons to avail themselves of its benefits. This is peculiarly the case in Virginia and North and South Carolina. Vast beds of this substance afford the means of restoring lands that have been worn out by constant cropping, and the success which has already attended experiments of this kind en-

courage to the further trial. Mr. Ruffin, to whom the South is so greatly indebted for his essay on the calcareous manures, in his late Survey of South Carolina, describes a most extensive bed of marl, extending through a large part of the eastern section of the State, which is easy of access and of a very excellent quality. The following statement is from the Southern Agriculturist, and gives an account of the experiments of Mr. Hammond in marling :

"Unmarled acre	361 lbs. seed cotton.					
"100 bushels do	451	do.	Increase	90 lbs.=	24.9	per cent.
"200 do do	384	do.	do	23	6.3	"
"300 do do	173	do.	Decrease	188	52	"

"The land, being very old, is bare of vegetable matter for marl to act on; to which, more than to the texture of the soil, inferior as it is, I attribute the failure of any great improvement from it. I make the statement, however, because it is valuable in many respects. It shows the danger of heavy marling on worn land, without previous rest or manure. The acre with three hundred bushels has been destroyed. There is one rich spot, the bottom of a small basin in the centre of it, which produced nearly all the cotton gathered. On the rest of it, the weed mostly died as soon as it came up. One hundred proves a better quantity than two hundred bushels, and perhaps a little less would have been still better on this soil—at least to begin with. All the lightest land in the fields marled with two hundred bushels was evidently injured, and now requires help. I anticipated this effect from what I saw last year, and reduced the quantity to one hundred and fifty bushels on all the land then marling. I have reduced it now to one hundred bushels, and shall hereafter marl at that rate. I prefer to go over it again, after I have finished all, and give it what it may prove itself able to bear after resting once or twice.

"The crop of this year has satisfied me perfectly that cotton will mature at least a fortnight earlier on marled than on unmarled land.

"Another unexpected effect of marl it may be worth while to state. I commenced in the spring of 1842 to put it in my stable pretty freely, for the purpose of improving my manure. I did not think of its having any material effect on the health of the mules; but I have had but little sickness among them, and have not lost one since; while previously I lost on the average four annually, and never in any year less than two. I attribute this change, in a great measure, to the absorption of noxious gases by the marl.

"I am now marling as actively as heretofore; and I esteem it so beneficial, that I have this summer marled a field of over two hundred acres, the average haul of which is three miles from my landing; and being tolerably fresh land, that has rested this year, and was sowed in oats last year, which were not cut, but grazed down after ripening, I have put on a hundred and fifty bushels."

FOOD FOR CATTLE.

The *economical feeding of cattle* is a subject of no little interest to the agricultural portion of our citizens. The attention of scientific as well as practical men is more turned to it from year to year. We have thought it would be useful, therefore, to add to what was said on this topic in the last report, several suggestions, which will be found in appendix No. 33. By the tables there found, the farmer may be able to estimate the compar-

ative value of the various kinds of fodder used, and how far one can be used as a substitute for the other. In the same appendix we have given an account, taken from an agricultural paper, of some experiments respecting the steaming of food for cattle; also, a condensed view of some experiments made by Mr. Stevenson, as to the feeding of farm horses, which we have taken from his essay in the Quarterly Journal of Agriculture. He received from the Highland Society the premium of ten sovereigns for his successful experiment reported.

In reference also to the fattening of cattle, and the quantity of food consumed, &c., much depends on the temperature at which cattle are kept. In appendix No. 33 will also be found an extract on this subject from Professor Johnston's lectures. The great excellence of oil cake, there stated, deserves notice; and to show the amount of oil, and proportion of oil cake, &c., in the seeds of plants raised for this purpose, we have given, in appendix No. 34, some extracts from Dr. Ure, and also a table of Veit, a German author, in E. Goodrich Smith's translation of Burger's Economy of Farming. These tables will be useful to those who wish to compare the relative value of the different oil plants. The variation in any case may be attributed to the difference of country, climate, &c.

The steaming up of cattle is carried on to a large extent in the West; and some interesting particulars relating to this subject, together with letters of gentlemen to whom application was made for information relating to this subject, as well as respecting the use of sheep in the same manner, will be found in appendix No. 35. It will be seen by these papers, that the raising of cattle and sheep may be made very profitable; and we can scarcely doubt that, before many years, more attention will be paid to this branch of business in the West and South than has been hitherto done. It is probable that not less than 50,000 or 60,000 sheep were purchased for the West during the last year. In many parts of our country we notice statements which show that the raising of sheep might also be rendered profitable for their wool. It appears, from the statistics of Lowell, that the amount of wool consumed in those factories alone (1,000,000 pounds) would require, at the rate of 3 pounds per sheep, at least 330,000 sheep. In a Rochester paper of July last, it is stated that more than 300,000 pounds of wool was purchased in that city during the month of June preceding, at prices 10 cents higher than the former year. The crop of wool in Washington county, Pennsylvania, for the season, is said to have been 800,000 pounds, which sold for $300,000. A million of pounds of wool was advertised for by a firm in New Orleans, for the French market; and the opinion is expressed in a public journal, that the wool business will yet perhaps exceed in quantity, if not in value, the cotton business. It now amounts to about one-quarter. The original Saxon clip in 1826, in Dutchess county, it is asserted on good authority, gave only 2 pounds to a clip; whereas the American product of last summer gave over 3 pounds—said to be the result of our better climate. If such be the case as far north as the State of New York, what might not be expected in the more mild climate of the South? We perceive by the public journals that various experiments are making by individuals in North Carolina, Georgia, &c., from which much may be expected.

The introduction of the Alpaca, or Peruvian sheep, is a subject which deserves attention. It is said that more than 2,000,000 pounds of wool of this animal were imported into Great Britain in 1843 from South America. Some papers relating to this subject, selected from the agricultural journals,

&c., may be found in appendix No. 36; and also on poultry, the annual product of which (see appendix No. 37) is $20,000,000 per annum.

The review we have taken of the crops and various products which are or may be raised among us leads most naturally to the inquiry, What are our prospects with respect to the disposal of the articles produced by the agricultural industry of our country? In former reports, we have considered this question, both with reference to our home and our foreign market. We shall pursue the same course at the present time.

HOME MARKET.

There are a great variety of articles which, as is well known, are absolutely needed for the support and comfort of our own citizens. These must, and will, of course, find a market, to the extent of that necessity, near the spot where they are produced. Others find, too, a ready sale by our internal commerce of one State with another. The man who raises nothing must be fed by the fruits of the labor of him who gathers the crop; while he, on his part, gives that return which his own industry or capital enables him to make. Every section of the country must, in some degree, be dependent on some other; and probably it is well that it is so; for, otherwise, the interchange of commodities would cease, and, in a degree, likewise, that intercourse which is essential to the best knowledge by fellow-citizens of each other. The great outlets of the West, pre-eminently the agricultural part of our country, are the Mississippi and the lakes. It is true that a portion of their products find their way through railroads and canals to Baltimore and Philadelphia; but, if we would estimate the amount of the trade, we must turn to these two great channels of commerce. By these, the agricultural products also find their market in foreign countries. The enterprise of our citizens is pressing still further beyond the Mississippi; and the ancient fable seems almost realized, in the rapidity with which towns and villages spring up. The following, which we cut from a public journal, is but a specimen of what is going on:

"*The growth of a village.*—The village of Oquawka, on the upper Mississippi, was laid out in 1836. At that time, provisions of every sort were obliged to be imported for the use of the settlers. Now, the tide has turned; and the insignificant village, within the present year, has made to St. Louis and other markets the following exports: 5,358 barrels of pork and lard; 124 barrels of beef; 2,584 barrels of flour; 40,000 bushels of wheat; 64 bales of hemp; 30 sacks of wool; 200 hogsheads of tobacco, a large quantity of corn, oats, hemp seed, hides, fur, peltries, and other articles."

The slaughter of pork and beef is increasing in many parts of the Western country. From a St. Louis paper, some months since, we gather the following information: That arrangements had been made there for slaughtering and packing down 60,000 hogs, and from 10,000 to 20,000 cattle. From 700,000 to 1,000,000 lbs. of beef also, it is stated, could be smoked each month during the season, at the establishments there. Of the Cincinnati trade it is stated—

There was shipped from Cincinnati to New Orleans during the past year $2,795,676 worth of the manufacture of hogs. Of the eight leading articles of Western produce, (pork, bacon and hams, lard, beef, flour, whiskey, cheese, and butter,) it would seem that Cincinnati alone ships more than one-half of the entire receipts at New Orleans. The whole value of these at New Orleans is said to have been $4,472,369.

There has, however, been a falling off, the past year, of perhaps one-third, in the pork made in the whole Western country.

The number of hogs packed in the Wabash valley, this season, is stated at 62,400—a falling off, compared with last season, of 82,600.

The New Orleans Bulletin, of the 26th December, says that the quantity of pork received at that port the present season is less by more than one-half the quantity received to the same time last year.

This will increase the price, and in this respect will be favorable to the farmer.

A single firm in Cincinnati, it is stated, sold in a single year 6,000 tons of cheese, in value $70,000 to $80,000. The cheese trade of that place for the year, it was supposed, would amount to upwards of 3,000,000 lbs., and reach in value $180,000 to $200,000. The number of hogs slaughtered there and at Covington is given at about 200,000 head. The value of the products of the hog, exported from Cincinnati during the first six months of 1844, is stated to have exceeded $1,500,000; to which other domestic products might be added, equal to at least $3,000,000 more.

The amount of home consumption of various articles may be judged from the following estimate for a year for the city of New York. It is probable that it falls short of, rather than exceeds, the truth.

The American Institute of New York has published a statement respecting the consumption of animal food yearly in that city. The weight of beeves killed yearly is 34,400,000 lbs.; sheep and lambs, 6,300,000 lbs.; hogs, 3,750,000 lbs.; calves, 990,000 lbs. Total, 45,449,000 lbs. The Republican says:

"Assuming the population of New York city to be 350,000, and that the consumption of animal food averages four ounces per day to each, the total consumption in a year amounts to 31,937,500 lbs.; to which may be added the amount consumed by commerce in the coasting and foreign trade, and also by the population in the immediate vicinity of the city—13,472,500 lbs.—fair estimate; it makes up and confirms the total before stated, of 45,449,000 lbs., which, at 3 cents per lb., amounts to $1,363,470."

Add to this the flour and other agricultural products, and take a similar ratio for other large cities, and it will be seen the amount of home consumption must be very great.

$2,000,000 worth of hogs, cattle, and sheep, are sold, annually, at Brighton, near Boston.

The amount of wheat passing through the Welland canal, up to 23d of July, is given as 1,958,000 bushels. This would probably be considerably increased during the remainder of the year; so that the whole amount would take off a good proportion of the surplus product of the States bordering on Lake Erie. The operation of Sir Robert Peel's corn bill on the Canada trade is said to have been great. There was exported at Montreal from the opening of navigation to the 11th of September, 1844, 241,276 bushels of wheat, against 15,417 the previous year; and 351,692 barrels of flour, against 57,497 of that year.

Immense quantities of wheat have been sent into Canada, and there ground; in which state it is allowed to be shipped as British produce.

The quantity of flour forwarded on the Erie canal from Buffalo the present season, notwithstanding the large quantities shipped from the lakes, by way of the Welland canal, was, to the 1st of August, 500,000 barrels; and of wheat, 940,000 bushels. There were forwarded, in the same period,

50,000 barrels of beef and pork, 40,000 bushels of corn and oats, and a million and a half pounds of wool. The amount of canal tolls received at that place was $292,000. There has been received in the same period, by the canal, 22,000 tons of merchandise, and 46,000 barrels of salt.

The great wheat State of Ohio, it is evident, promises less respecting this chief staple than she has done. In appendix No. 38 we have thrown together some extracts from a recent report of commissioners appointed to take an agricultural survey of a part of this State, and which embraces some interesting facts deserving attentive consideration.

In appendix No. 39, also, we have placed an extract from a Southern paper, relating to the home production of cotton bagging and other articles; which indicates that the attention of some of those States is most likely to be more fully turned to that subject.

FOREIGN MARKET.

Our articles of produce are also gradually finding increasing favor in foreign markets. Some of them, scarcely known before, appear to be gradually introduced. Of this description are Indian corn, hay, apples, &c., which seemed to be received with more or less favor. The quantity of Indian corn shipped to England, from New York, the first eight months of 1844, was 190,000 bushels; in 1843, only 35,000 bushels.

In an English paper it is stated that American cheese has already driven the Dutch cheese out of the market. Our hams and beef are generally becoming more popular. One cause of the superiority of English beef is in the preparation of the animal for slaughter. In this country, our cattle are knocked down, bled a short time, left to cool, and then barrelled. The English, on the contrary, bleed for several days previous to killing. This custom is now practised in some of the Eastern cities, and occasions the whitest color of the meats in the best markets. A grazier of high respectability from the West, now a member of Congress, states that he lately sold a large lot of cattle in New York; 15 or 20 were butchered daily; for several days previous to killing, the ox was tied in a stall, with no food, and only a little water; he was bled three successive days, until he fainted and fell; the issue was then tied up, and the ox recovered. After this, he was slaughtered. The butcher thus accomplished two objects: he lessened the weight of beef, and increased the beauty of its appearance on the stall. So many subterfuges are resorted to by the purchasers to effect a good trade for themselves, by increasing the offal when the quarters are weighed, that drovers prefer to sell the ox at so much per pound live weight; and this is certainly fair for both, and a great check on fraud. In appendix No. 40 will be found a letter from Mr. Scott, of this city, lately from England. His experience in grazing has been great, and his letter, we think, will be read with interest.

In appendix No. 41 will be found a method of packing provisions for the English market, illustrated by an appropriate cut, which will also aid in understanding the directions there given. In the same appendix we have also added prices current of two firms, which, though in some respects similar, yet also contain a variety of particulars in which they furnish additional information. These are the latest accounts we have as to the state of the English market in American produce.

The late treaty with China must probably open to us eventually—if not directly, yet indirectly—a new channel, through which will be poured the

products, in some shape or other, of our fields, and the industry of our citizens. It is stated that, within a year, there has been an increase of our exports to China of 1,500,000 yards of cotton shirting; and that, in the last four years, there have been sent to the Chinese market 100,000,000 yards of plain cottons. It is true that by far the larger portion of this is from Great Britain; but we are gaining from year to year.

The following are given as specimens of some of the exports to foreign countries. Others might be added:

"*Cargo of the packet ship Samuel Hicks, for Liverpool.*—562 bales cotton, 1,650 barrels turpentine, 2,053 barrels flour, 250 barrels lard, 200 barrels flaxseed cakes, 27 barrels bread and corn meal, 2 cases veneers, 460 bushels Indian corn, 285 bundles (45 tons) hay."

"*Cargo of ship Toronto, for London.*—25 bales American hemp, 500 barrels turpentine, 250 tons linseed cake, 65 packages manufactured tobacco, 250 tierces beef, 10,000 gallons sperm oil, 8,000 pounds spermaceti, 20 tons tallow, 130 hogsheads tobacco strips, 15 packages furs and skins."

"*Cargo of vegetables, &c.*—A vessel cleared at Boston, last week, for Demarara, with the following cargo: 150 barrels apples, 16 kegs butter, 10 barrels carrots, 3,000 cabbages, 200 celery roots, 15 boxes cheese, 6 half barrels cranberries, 50 barrels green corn, 10 half barrels eggs, 4,000 fresh fish, 75 live hogs, 200 lobsters, 50 barrels onions, 100 boxes oysters, 50 barrels potatoes, 75 live sheep, 50 half barrels turnips, 10 boxes poultry, 15 boxes peaches and pears, and 150 tons of ice."

"*Exports to Europe.*—The packet ship Mediator, from New York, for London, takes out 358 tierces of beef, 288 of clover, 200 casks of ashes, and 112 of cheese. The Cambridge, for Liverpool, takes 525 firkins of butter, 300 tierces of flaxseed, 40 of beef, 100 boxes cheese, and 50 hogsheads of tallow."

Looking, then, both at home and abroad, embracing with enlarged views the state of our agricultural supplies, and the hopes we may reasonably cherish, we still feel that there is no ground for discouragement. Prices may be comparatively low; but a starving people are not lifting up an imploring cry for the very necessaries of life. Some of our products may be diminished; but still we have enough, the country through, and to spare, for those whose hands and hearts open to receive our interchange of commodities. The East and the West are drawing into closer proximity; vast chains of railroads and canals are, as it were, planting a depot or fixing a port of entry nearer to every man's door; while there are breaking out, like the pent-up fires of the internal earth, and heaving into sight, alike with new elements to be wrought, the kindling forge, the smoke and din of factories, where industry, toil, and enterprise, of one kind and another, greet the farmer as he bears to them the fruits of his healthful and useful occupation, to feed the multitudes which crowd into those cities of invention and machinery. Amid all the inequalities which must always more or less abound in climate, soil, and kindred elements, there is still an onward impulse, and the restless spirit of enterprise cannot stop. Year after year must add to the development of our resources; and if, perchance, there may or must be a change in the direction of labor, yet labor cannot always be profitless. The evils of overcharged production, a better judgment will rectify; and if we are true to ourselves, we need fear no foreign competition; nor that markets will not gradually be found, which will echo back, in calls for aid, their response to our inquiry if they can receive the extending surplus of the products of our national industry.

APPENDIX.

No. 1.

Observations communicated at the request of the Hon. H. L. Ellsworth, by E. C. Herrick, librarian of Yale College, Conn.

THE HESSIAN FLY.

The insect commonly called the *Hessian fly*, which has for so many years ravaged the wheat fields of our country, appears to have been wholly unknown here before the American Revolution. It is usually stated that the insect was first noticed in the year 1776 or 1779, on Staten Island and the westerly end of Long Island, and was generally supposed to have been introduced among straw brought hither by the Hessian troops in the service of Great Britain. The ravages of the insect soon attracted general attention; and as early as the year 1788, serious apprehensions were excited in England that the destroyer might be conveyed thither in some cargo of wheat. The alarm there was so great, that the Government took up the matter; "the Privy Council sat day after day, anxiously debating what measures should be adopted to ward off the danger of a calamity more to be dreaded, as they well knew, than the plague or pestilence; expresses were sent off in all directions to the officers of the customs at the outports, respecting the examination of cargoes; despatches written to the ambassadors in France, Austria, Prussia, and America, to gain that information, of the want of which they were now so sensible; and so important was the business deemed, that the minutes of the council, and the documents collated from, fill upwards of 200 octavo pages." (Kirby and Spence, i, 50.) On the 25th of June of that year, an order in council was issued, prohibiting the entrance into Great Britain of wheat raised in any of the territories of the United States; intending, by this measure, to keep out the much-dreaded enemy. Soon after the arrival of the news of this order, the supreme executive council of Pennsylvania addressed a letter of inquiry to the "Philadelphia Society for Promoting Agriculture," who promptly replied that the plant of the wheat alone was injured, and that the insect was not propagated by sowing the grain which grew on fields infected with it. The prohibition was doubtless based on the erroneous representation of Sir Joseph Banks and Dr. Blagden, which they continued to enforce, even after they were better instructed by Dr. Currie. It is sufficiently remarkable, that, although the wheat was prohibited an "entry," it was allowed to be stored; so that the Hessian fly, if concealed among the grain, would, after all, have had a good opportunity to escape into the country. In eight or ten months, the Government bought the imprisoned wheat at prime cost, kiln-dried it, and resold it at great loss, and almost immediately took off the prohibition. (Memoir of Currie, ii, 65.)

In the course of a few years after this, the Hessian fly was found in every part of our country where wheat was cultivated. From the period of the Revolution down to the present time, no insect in the land has re-

ceived so much public attention, or has called out so many scores of pages of observation and speculation. These are to be found scattered through magazines, agricultural journals, and common newspapers. But, in defiance of them all, the Hessian fly continues its destructive work, and is probably as little under the actual control of man as it was half a century ago.

Whether this insect was an original inhabitant of this country, or was imported by the Hessian soldiers, is a question not yet settled. At the time of the discussion which led to the prohibitory order, an extensive inquiry in Europe resulted in the conclusion that the insect was wholly unknown there. Yet, in the year 1834, it was found existing in several places in southern Europe, and injuring the wheat in the same manner as in this country. This important discovery was made by my friend, Mr. James D. Dana, who had previously been engaged with me in the examination of the Hessian fly, and was well qualified to decide upon the case. (American Journal of Sciences, xli, 153.) Moreover, we have an account from the vicinity of Geneva, in Switzerland, reported by Duhamel, of an insect destroying the wheat there as long since as 1732, in the manner of the Hessian fly; and an account, in 1823, by Raddi, of what is probably the same insect, in various places in Italy. No traces have been detected of any insect of the habits of the Hessian fly, in our country, earlier than the year 1776; and if this insect is a native of North America, what plant sustained it before wheat, rye, and barley, were imported? On the other hand, we have no proof that the Hessian fly has ever been found in Germany; and it is certain that, if the wheat were reaped in the ordinary manner, nearly all the available insects would be left in the stubble; and, further, the straw alleged to have been brought by the Hessians must have been that which ripened in the summer of 1775, and from which most of the insects which it contained would have escaped before August, 1776. On a question of such uncertainty, no one need quarrel with another's opinion.

The first scientific description of the Hessian fly was published in the Journal of the Academy of Natural Sciences of Philadelphia, for July, 1817, (No. 3, i, 45,) by the late distinguished entomologist, Thomas Say. He there gives it the systematic name of the *cecidomyia destructor;* and to his description adds a few remarks relative to its habits, and furnishes, also, an account of another insect, by which the fly is often destroyed. Without going into a minute and tedious technical description, the following account is offered, as probably sufficient to enable an observer to identify the insect in its various transformations: The Hessian fly is a two-winged insect, with head, eyes, and thorax, black; the head is small and depressed; the palpi (or mouth feelers) are three or four jointed—the basal one being the smallest; the antennæ are about half as long as the body, and consist each of from 14 to 17 oval joints, besides the basal joint, which appears double; the wings are large, hairy, rounded at the tip, and have each two or three longitudinal nervures; the abdomen is of a tawny red, and furnished, irregularly, with many black hairs; consists of seven rings or segments, besides the ovipositor, which is of two sides, and of a rose-red color; the ovipositor, when extended to the utmost, is about one-third as long as the abdomen; length of body, from the front of the head to the end of the abdomen, about one-eighth of an inch; the legs are

long and slender, pale red, and covered sparsely with dark hair. The male is equal in size to the female, but generally less black, with antennæ somewhat longer, and about three-fourths the length of the body. The joints of the antennæ are globular, and slightly separated from each other. Several other species of the genus *cecidomyia*, or one closely allied to it, are common in this region. But the Hessian fly is the largest and darkest of our species with which I am acquainted.

The eggs are laid in the long creases or furrows of the upper surface of the leaves (*i. e.* the blade or strap-shaped part) of the young wheat plant. While depositing her eggs, the insect stands with her head towards the point or extremity of the leaf, and at various distances between the point and where the leaf joins and surrounds the stalk. The number found on a single leaf varies from a single egg up to thirty, or even more. The egg is about a fiftieth of an inch long, cylindrical, rounded at the ends, glossy and translucent, of a pale-red color, becoming, in a few hours, irregularly spotted with deeper red. Between its exclusion and its hatching, these red spots are continually changing in number, size, and position; and sometimes nearly all disappear. A little while before hatching, two lateral rows of opaque white spots, about ten in number, can be seen in each egg. In four days, more or less, according to the weather, the egg is hatched; the little wrinkled maggot, or larva, creeps out of the delicate membranous egg skin, crawls down the leaf, enters the sheath, and proceeds along the stalk, usually as far as the next joint below. Here it fastens, lengthwise, and head downwards, to the tender stalk, and lives upon the sap. It does not gnaw the stalk, nor does it enter the central cavity thereof; but, as the larva increases in size, it gradually becomes imbedded in the substance of the stalk. After taking its station, the larva moves no more, gradually loses its reddish color and wrinkled appearance, becomes plump and torpid, is at first semi-translucent, and then more and more clouded with internal white spots; and, when near maturity, the middle of the intestinal parts is of a greenish color. In five or six weeks (varying with the season) the larva begins to turn brown, and soon becomes of a bright chestnut color. In this state, the insect bears some resemblance to a flax seed; and many observers speak of this as the *flax-seed* state. The larva has now become a chrysalis, or pupa, and takes no more food. The pupa within gradually cleaves off from the outer skin, and, in the course of two or three weeks, is entirely detached from it, so that the skin of the larva (now brown and hardened, and of a sort of leathery texture) has become a case or shell for the pupa inside.

The *pupa shell* is, of course, in size and form, like the larva: it is oval, bulging out beneath, and of the same curve above as the outside of the stalk; divided by cross lines into twelve segments, and is about an eighth of an inch long. Within this shell the pupa gradually advances towards the winged state; it contracts in length, but not in breadth; and its skin appears covered with minute elevations. Just before evolution, we find the pupa invested in a delicate membrane, or scarf, (which, not long previous, was its outer skin,) through which many parts of the future fly may be distinctly seen. Finally, this scarf splits along the thorax, or back, and the insect comes forth, both from this and the pupa shell, a perfect two-winged fly.

This is, in brief, the history of an individual which has been so fortunate as to escape all the numerous enemies with which its race is sur-

rounded from the moment the egg is deposited; but of these, more hereafter.

In the Northern and Middle States, at least, winter wheat is sown in September or October. Soon after the plants have appeared above ground, the Hessian fly begins to lay her eggs upon them; and this operation is continued during several weeks, according to the season. The eggs laid on the green leaves are in a few days hatched, and the young larvæ crawl down the stalk, and take their stations; generally clustering around the stalk at the nearest joint below. Here, by sucking of the plant, they increase in size, become full and hard, and, pressing deeply into the stalk, they impair its growth; and if their number about one joint is large, the stalk is killed. Frequently the plant, although impoverished, advances far enough to head out; but when the grain begins to fill, its own weight, or perhaps the wind, causes the stalk to break down. The injury done to the wheat is occasioned by the exhaustion of the sap, and by the pressure on the yielding stalk.

In five or six weeks the larvæ stop feeding, the outer skin turns brown, and within this brown and leathery case the pupæ pass the winter—generally a little below the surface of the earth. In April and May the fly is again found depositing her eggs on the same wheat, (viz: that from grain sown the preceding autumn,) and also on the spring wheat which has just come up. These eggs hatch, and the larvæ therefrom operate in the same manner as those of the autumn previous. These larvæ become pupæ about the middle of June. The flies which lay their eggs in the spring are probably in part from the pupæ which became such late in the preceding autumn, and partly from pupæ contained in stubble left the preceding summer. The period of the existence of the Hessian fly in the pupa or flax-seed state is exceedingly variable. After much observation, my own opinion is, that, in general, pupæ which become such late in the autumn evolve the winged insect partly during the next spring, and partly in the summer and autumn following. Those pupæ which become such about June evolve the winged insect partly during the next autumn and partly during the year succeeding.

The Hessian fly is attacked by numerous foes, which, in various stages of its existence, destroy a large part of every generation. Whether it has, in its winged state, any enemies, except the ordinary destroyers of flies, I know not. The eggs, while lying on the leaves of the young plant, are visited by a very minute four-winged insect, (a species of platygaster,) which lays in them its own eggs. From later observation, it appears that, occasionally, as many as five or six eggs of this parasite are laid in a single egg of the Hessian fly. The latter egg hatches and becomes a pupa, as usual; but from the pupa case, instead of the Hessian fly, issues one or more of these minute parasites.

The pupæ, while imbedded in the stalk, are attacked by at least *three* different minute parasites, (four-winged hymenoptera,) which, boring through the sheath of the stalk, deposite their eggs in the body within; and the latter is finally devoured by the parasite larvæ. These are the principal means by which the multiplication of the Hessian fly is restrained within tolerable limits.

Although the loss annually sustained by the wheat growers of this country, in consequence of the ravages of the Hessian fly, is severe, yet it is well nigh impossible to ascertain even its probable amount. As long

since as 1800, Dr. S. L. Mitchill, of New York, affirmed that the "insect is more formidable to us than would be an army of twenty thousand Hessians." In 1804, President Dwight, of Yale College, remarked that "this insect is feeble and helpless in the extreme, defenceless against the least enemy, and crushed by the most delicate touch; yet, for many years, it has taxed this country, annually, more, perhaps, than a million of dollars." At the present day, the amount of the injury inflicted probably far exceeds what it was forty years since; and to discover some feasible mode of exterminating the insect, or at least of arresting its ravages, is an object of great importance to this country.

Various remedial measures have, from time to time, been proposed; most of which I will here state.

1st. Steeping the seed wheat in elder juice, solution of nitre, boiling water, or other liquids; or rolling in lime, ashes, or some other substance, in order to kill the eggs. But as the eggs of the Hessian fly are not on the seed, they will never be hurt by such processes. So far as these means give vigor to the plant, they may be of some little service.

2d. Sowing seed obtained from places in which the insect has not made its appearance, (American Museum, iv, 47.) This recommendation also assumes the error, that the eggs are laid on the grain, and will be found, as it has often proved, useless as respects this insect.

3d. Abstaining, rigidly throughout the whole grain-growing region of North America from planting wheat, rye, barley, or oats, for one, two, or three years, and thus to starve out the insect! This plan might be effectual, but would obviously involve some inconveniences.

4th. Manuring the land very highly, so that the plants will grow vigorously, and be sooner out of the way of the insect, and also better able to resist it. This proposal has some merit, but does nothing towards destroying the insect.

5th. Sowing some variety of bearded wheat, flint wheat, &c., supposed to have a harder and more solid stalk than common wheat, and better able to withstand the impression of the larvæ. A suggestion of some value, but, equally with 4th, leaves the insect unharmed.

6th. Fumigating the wheat field, and sprinkling the young wheat with infusion of elder and with other steeps. If successful, which is quite uncertain, it is plain that these measures are impracticable on a large scale.

7th. Sowing winter wheat very late in the autumn, so that the fly shall have mostly disappeared before the plants are large enough to be attacked. No doubt this plan is to some extent useful, but the wheat sown late is in great danger of perishing during the winter. The fly will of course attack it in the spring, yet one attack will do less damage than two.

8th. Sowing oats early in autumn on the intended wheat field. It is supposed the fly will lay its eggs on the plant; then let them be ploughed in, and the wheat sown. The fly having nearly exhausted itself on the oats, the wheat will suffer less. This plan may possibly be of some partial utility.

9th. Drawing a heavy roller over the young wheat, both in autumn and spring. This process must be useful, in crushing many eggs and larvæ.

10th. Permitting sheep and other animals to graze the wheat fields while the insects are laying their eggs. By these means, large numbers of the eggs will be devoured with the leaves.

11th. Burning the stubble immediately after harvest, and ploughing in

the remains. This is by far the most practicable and effectual mode of exterminating the insect, or, at least, of checking its increase. In the stubble are many pupæ of the fly, at this time completely in our power; if, in reaping, the stubble is left high, the fire would sweep rapidly over a field, and destroy nearly all these pupæ; the few which escaped the fire would, by the plough, be buried so deep as to perish in the earth; mere ploughing in of the stubble must be highly useful. If the two recommendations last named were thoroughly put in practice over the whole country—not only upon wheat, but also on rye and barley, and any other plants attacked by the Hessian fly—the ravages of this insect would, in all probability, ere long, become scarcely worthy of notice.

It may not be improper, in this place, to state that the foregoing account of the habits of the Hessian fly is derived from my own long-continued observations, and that I have moreover endeavored to consult all the papers of any importance which have been published on the subject.

There are in the United States, besides the Hessian fly, several other insects which attack the wheat while in the field. Those persons who assert that the former lays its eggs on the grain in the spike or head, have undoubtedly mistaken for the Hessian fly some one of these other insects. The following brief notices of the more important of these enemies, I have abridged from the accounts comprised in Dr. T. W. Harris's "*Treatise on some of the Insects of New England, which are Injurious to Vegetation,*" (Camb. 1842. 459 pages, 8vo.,) a work of great interest and value.

In it the inquirer will find a faithful digest of all the reliable information we have on the numerous insects which injure our plants, fruits, and trees; and, in addition, he will learn the means of defence, so far as any have been discovered. The book ought to be in the hands of every intelligent farmer and orchardist.

1. A grain moth, (Angoumois moth—*alucita cerealella*, Oliv.,) probably the same as described by Colonel Carter, in the *Transactions of the American Philosophical Society*, volume i, 1771; and by J. Lorain, in Mease's *Archives of Useful Knowledge*, volume ii, 1812. It is about three-eighths of an inch long when its wings are shut. The upper wings are of a light brown satin color and lustre, covering the body horizontally above, but drooping a little at the sides. The lower wings and the rest of the body are ash-colored. The moth lays her eggs usually on the young and tender grain in the field; each caterpillar from these eggs selects a single grain, burrows into it, and remains concealed, devouring the meal within. Subjecting the grain to a heat of 167° Fahr., for twelve hours, in an oven, will kill the insect.

2. *The English wheat fly* (*tipula tritici*, Kirby) is a small orange-colored two-winged gnat, which lays its eggs in the head of wheat while blossoming. The maggots from these eggs are without feet, tapering towards the head, at first perfectly transparent and colorless, but soon becoming orange-yellow; and when mature, are each about an eighth of an inch long. It is supposed they devour the pollen, and prevent the setting of the grain; the maggots fall from the spike to the earth, within which they undergo their final transformations. This insect (or one very

similar to it) has done much damage in the Northern States and in Canada for several years past; but no effectual mode of preventing the mischief, or of destroying the insect, appears to have been devised.

3. *The wheat caterpillar.*—This is a span worm of brownish color, with twelve feet—six near each end of the body. It feeds on the kernel in the milky state, and also devours the germinating end of the ripened grain. It is said to be found in the chaff when the grain is threshed. We have little certain knowledge concerning the parent insect or its transformations.

In addition to these three, there are probably other insects more or less injurious to our wheat crops. Much has been published in our journals relative to these depredators; yet their habits are imperfectly understood, and many of the accounts are confused and contradictory. It is greatly to be desired, that all who have the opportunity should endeavor to make careful observations, and communicate them to the public.

These observations must be accompanied by accurate descriptions of the insect under examination, and in its various stages; otherwise, most of the labor will be spent in vain.

No. 2.

Extracts from Dr. Harris's work.

ON INSECTS.

The wheat crops in England and Scotland often suffer severely from the depredations of the maggots of a very small gnat, called the wheat fly, or the *cecidomyia tritici* of Mr. Kirby. This insect seems to have been long known in England, as appears from the following extract from a letter, by Mr. Christopher Gullet, written in 1771, and published in the "Philosophical Transactions" for 1772: "What the farmers call the yellows in wheat, and which they consider as a kind of mildew, is, in fact, occasioned by a small yellow fly, with blue wings, about the size of a gnat. This blows in the ear of the corn, and produces a worm, almost invisible to the naked eye; but, being seen through a pocket microscope, it appears a large yellow maggot, of the color and gloss of amber, and is so prolific that I distinctly counted forty-one living yellow maggots in the husk of one single grain of wheat—a number sufficient to eat up and destroy the corn in a whole ear. One of those yellow flies laid at least eight or ten eggs, of an oblong shape, on my thumb, only while carrying by the wing across three or four ridges. In 1795, the history of this insect was investigated by Mr. Marsham;* and since that time Mr. Kirby,† Mr. Gorrie, and Mr Shirreff,‡ have also turned their attention to it. The investigations of these gentlemen have become very interesting to us, on account of the recent appearance in our own country, and the extensive ravages, of an insect apparently identical with the European wheat fly. The following account of the latter will serve to show how far the European and American wheat flies agree in their essential characters and

* "Transactions of the Linnean Society," vol. iii, p. 142, and vol. iv, p. 224.
† "Transactions of the Linnean Society," vol. iv, p. 230, and vol. v, p. 96.
‡ "Coudon's Magazine of Natural History," vol. ii, pp. 323 and 448.

in their habits.* The European wheat fly somewhat resembles a musquito in form, but is very small, being only about one-tenth of an inch long. Its body is orange-colored. Its two wings are transparent, and changeable in color; they are narrow at the base, rounded at the tip, and are fringed with little hairs on the edges. Its long antennæ, or horns, consist, in the female, of twelve little bead-like joints, each encircled with minute hairs; those of the male will probably be found to have a greater number of joints. Towards the end of June, or when the wheat is in blossom, these flies appear in swarms in the wheat fields during the evening, at which time they are very active. The females generally lay their eggs before nine o'clock at night, thrusting them, by means of a long retractile tube in the end of their bodies, within the chaffy scales of the flowers, in clusters of from two to fifteen, or more. By day they remain at rest on the stems and leaves of the plants, where they are shaded from the heat of the sun. They continue to appear and lay their eggs throughout a period of thirty-nine days. The eggs are oblong, transparent, and of a pale buff color, and hatch in eight or ten days after they are laid. The young insects produced from them are little footless maggots, tapering towards the head, and blunt at the hinder extremity, with the rings of the body somewhat wrinkled and bulging at the sides. They are at first perfectly transparent and colorless, but soon take a deep yellow or orange color. They do not travel from one floret to another, but move in a wriggling manner, and by sudden jerks of the body, when disturbed. As many as forty-seven have been counted in a single floret. It is supposed that they live at first upon the pollen, and thereby prevent the fertilization of the grain. They are soon seen, however, to crowd around the lower part of the germ, and there appear to subsist on the matter destined to have formed the grain. The latter, in consequence of their depredations, becomes shrivelled and abortive; and, in some seasons, a considerable part of the crop is thereby rendered worthless. The maggots, when fully grown, are nearly one-eighth of an inch long. Mr. Marsham and Mr. Kirby found some of them changed to pupæ within the ears of the wheat; and from these they obtained the fly early in September. The pupa, represented by them, is rather smaller than the full-grown maggot, of a brownish-yellow color, and of an oblong oval form, tapering at each end. The pupæ found in the ears were very few in number—scarcely one to fifty of the maggots. Hence Mr. Kirby supposes that the latter are not ordinarily transformed to flies before the spring. Towards the end of September, he carefully took off the skin of one of them, and found that the insect within still retained the maggot form, and conjectures that the pupa is not usually complete until the following spring. According to Mr. Gorrie, the maggots quit the ears of the wheat by the 1st of August, descend to the ground, and go into it to the depth of half an inch. That they remain here, unchanged, through the winter, and finish their transformations, and come out of the ground in the winged form in the spring, when the wheat is about to blossom, is rendered probable from the great number of the flies found by Mr. Shirreff, in the month of June, in all the fields where wheat had been raised

* See also my article on wheat insects in the "New England Farmer for March 31, 1841 xix, p. 306.

the year before. The increase of these flies is somewhat checked by the attacks of three different parasites, which have been described by Mr. Kirby.

An insect, resembling the foregoing in its destructive habits, and known, in its maggot form, by the name of the "grain worm," has been observed, for several years, in the Northern and Eastern parts of the United States, and in Canada. It seems, by some, to have been mistaken for the grain weevil, the Angoumois grain moth, and the Hessian fly; and its history has been so confounded with that of another insect, also called the grain worm in some parts of the country, that it is difficult to ascertain the amount of injury done by either of them alone. The wheat fly is said to have been first seen in America about the year 1828,* in the northern part of Vermont, and on the borders of Lower Canada. From these places its ravages have gradually extended, in various directions, from year to year. A considerable part of Upper Canada, of New York, New Hampshire, and of Massachusetts, have been visited by it; and, in 1834, it appeared in Maine, which it has traversed, in an easterly course, at the rate of twenty or thirty miles a year. The country over which it has spread has continued to suffer more or less from its alarming depredations, the loss by which has been found to vary from about one-tenth part to nearly the whole of the annual crop of wheat; nor has the insect entirely disappeared in any place till it has been starved out by a change of agriculture, or by the substitution of late-sown spring wheat for the other varieties of grain. Many communications on this destructive insect have appeared in "The Genesee Farmer," and in "The Cultivator," some of them written by the late Judge Buel, by whom, as well as by the editors of "The Yankee Farmer," rewards were offered for the discovery of the means to prevent its ravages. Premiums have also been proposed, for the same end, by the "Kennebec County Agricultural Society," in Maine, which were followed by the publication, in "The Maine Farmer," of three "essays on the grain worm," presented to that society. These essays were reprinted in the seventeenth volume of the "New England Farmer," wherein, as well as in some other volumes of the same work, several other articles on this insect may be found. From these sources, and more especially from some interesting letters wherewith I have been favored by a lady lately resident in Hopkinton, Hew Hampshire, the foregoing and following statements are chiefly derived. A continued series of observations, conducted with care, and with a due regard to dates, is still wanted, to complete the history of the various insects which are injurious to grain in this country. Could Mr. Herrick (who is so well qualified for the task) be induced to devote the necessary time and attention to this subject, we have reason to think that the interests of science and of agriculture would be greatly promoted thereby.

The American wheat insect, in its winged form, has not yet fallen under my notice. It is stated by Judge Buel, Mrs. Gage, and others, to agree exactly with the description of the European wheat fly, (*cecidomyia tritici*,) being a very small orange-colored gnat, with long slender legs, and two transparent wings, which reflect the tints of the rainbow. Immense

* Judge Buel's report in "The Cultivator," vol. vi, page 26; and "New England Farmer," vol. ix, page 42. Mr. Jewett says that its first appearance in western Vermont occurred in 1820. (See "New England Farmer," vol. xix, page 301.)

swarms of these orange-colored gnats infest fields of grain towards the last of June. While the sun shines, they conceal themselves among the leaves and weeds near the ground. They take wing during the morning and evening twilight, and also in cloudy weather, when they lay their eggs in the opening flowers of the grain. New swarms continue to come forth, in succession, till the end of July; but Mr. Buel says that the principal deposite of eggs is made in the first half of July, when late-sown winter wheat and early-sown spring wheat are in the blossom or milk. The flies are not confined to wheat alone, but deposite in barley, rye, and oats, when these plants are in flower at the time of their appearance. The eggs hatch in about eight days after they are laid, when the little yellow maggots or grain worms may be found within the chaffy scales of the grain. Being hatched at various times during a period of four or five weeks, they do not all arrive at maturity together. Mrs. Gage informs me that they appear to come to their growth in twelve or fourteen days. Specimens of these maggots, which she has sent to me, were found to agree, in every respect, with the descriptions and figures of those of the European wheat fly. They do not exceed one-eighth of an inch in length, and are not provided with feet. From two to fifteen or twenty have been found within the husk of a single grain, and sometimes in every husk in the ear. After a shower of rain, they have been seen in such countless numbers on the beards of the wheat, as to give a yellow color to the whole field.* These insects prey on the grain in the milky state, and their ravages cease when the grain becomes hard. They do not burrow within the kernels, but live on the pollen and on the soft matter of the grain, which they probably extract from the base of the germs. It appears, from various statements, that very early and very late wheat escape with comparatively little injury; the amount of which, in other cases, depends upon the condition of the grain at the time when the maggots are hatched. When the maggots begin their depredations, soon after the blossoming of the grain, they do the greatest injury; for the kernels never fill out at all. Pinched or partly filled kernels are the consequence of their attacks when the grain is more advanced. The hulls of the impoverished kernels will always be found split open on the convex side, so as to expose the embryo. This is caused by the drying and shrinking of the hull, after a portion of the contents thereof has been sucked out by the maggots. Towards the end of July, and in the beginning of August, the full-grown maggots leave off eating, and become sluggish and torpid, preparatory to moulting their skins. This process, which has been alluded to by Judge Buel, and some other writers, has been carefully observed by Mrs. Gage, who has sent to me the maggots before and after moulting, together with some of their cast skins. It takes place in the following manner: The body of the maggot gradually shrinks in length within its skin, and becomes more flattened and less pointed, as may easily be seen through the delicate transparent skin, which retains nearly its original form and dimensions, and extends a little beyond the included insect at each end. The torpid state lasts only a few days; after which, the insect casts off its skin, leaving the latter entire, except a little rent in one end of it. This cast skin is exceedingly thin and colorless, and, through a microscope, is seen to be marked with eleven transverse

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* "New England Farmer," vol. xii, page 60.

lines. After shedding its skin, the maggot recovers its activity, and writhes about as at first, but takes no food. It is shorter, somewhat flattened, and more obtuse than before, and is of a deeper yellow color, with an oblong greenish spot in the middle of the body. Within two or three days after moulting, the maggots either drop of their own accord, or are shaken out of the ears by the wind, and fall to the ground. They do not let themselves down by threads, for they are not able to spin. Nearly all of them disappear before the middle of August; and they are very rarely found in the grain at the time of harvest. Some persons have stated that they are transformed to flies in the ears of the grain; having, probably, mistaken the cast skins found therein for the shells of the chrysalis or pupa. We have good reason for believing that the maggots burrow in the ground, and remain there unchanged, in a torpid state, through the winter. Whether, on the approach of spring, they again cast off their skins, in order to become pupæ, or whether the skin hardens and remains as a shell to protect the pupa, has not been determined; but it is probable that the skin is not cast off till the insect comes forth in the winged form. The last change seems to occur in June and July, when great numbers of the flies have been seen, apparently coming from the ground, in fields where grain was raised the year before.

Several cases of the efficacy of fumigation in preventing the depredations of these insects are recorded in our agricultural papers.* For this purpose brimstone has been used, in the proportion of one pound to every bushel of seed sown. Strips of woollen cloth, dipped in melted brimstone, and fastened to sticks in different parts of the field, and particularly on the windward side, are set on fire, for several evenings in succession, at the time when the grain is in blossom; the smoke and fumes thus penetrate the standing grain, and prove very offensive or destructive to the flies, which are laying their eggs. A thick smoke from heaps of burning weeds, sprinkled with brimstone, around the sides of the field, has also been recommended. Lime or ashes strewn over the grain when in blossom, has, in some cases, appeared to protect the crop; and the Rev. Henry Colman, the commissioner for the agricultural survey of Massachusetts, says that this preventive, if not infallible, may be relied on with strong confidence.† For every acre of grain, from one peck to a bushel of newly slaked lime, or of good wood ashes, will be required; and this should be scattered over the plants when they are wet with dew or rain. Two or three applications of it have sometimes been found necessary. Whether it be possible to destroy the maggots after they have left the grain, and have betaken themselves to their winter quarters, just below the surface of the ground, remains to be proved. Some persons have advised burning the stubble, and ploughing up the ground soon after the grain is harvested, in order to kill the maggots, or to bury them so deeply that they could not make their escape after they were transformed to flies. Perhaps thoroughly liming the soil before it is ploughed may contribute to the destruction of the insects. It is stated that our crops may be saved from injury by sowing early in the autumn or late in the spring. By the first, it is supposed that the grain will become hard before many of the flies make their appearance; and by the latter, the plants do not come

* Among others, see "The Cultivator," vol. v, p. 136.

† "Third Report on the Agriculture of Massachusetts," p. 67.

into blossom until the flies have disappeared. In those parts of New England where these insects have done the greatest injury, the cultivation of fall-sown or winter grain has been given up; and this, for some years to come, will be found the safest course. The proper time for sowing in the spring will vary with the latitude and elevation of the place, and the forwardness of the season. From numerous observations made in this part of the country, it appears that grain sown after the 15th or 20th of May generally escapes the ravages of these destructive insects. Late sowing has almost entirely banished the wheat flies from those parts of Vermont where they first appeared; and there is good reason to expect that these depredators will be completely starved out and exterminated, when the means above recommended have been generally adopted and persevered in for several years in succession.

Mrs. Gage has discovered another pernicious insect in the ears of growing wheat. It seems to agree with the accounts of the *thrips cerealium*, which sometimes infests wheat in Europe to a great extent. This insect belongs to the order *hemiptera*. In its larva state, it is smaller than the wheat maggot, is orange-colored, and is provided with six legs, two antennæ, and a short beak, and is very nimble in its motions. It is supposed to suck out the juices of the seed—thus causing the latter to shrink, and become what the English farmers call *pungled*. This little pest may probably be destroyed by giving the grain a thorough coating of slaked lime.

Our agricultural papers contain some accounts of an insect or of insects much larger than the maggots of the wheat fly, growing to the length of three-eighths of an inch, or more, and devouring the grain in the ear and after it is harvested. The insects to which I allude have received the names of wheat worms, gray worms, and brown weevils; and, although these different names may possibly refer to two or more distinct species, I am inclined to think that all of them are intended for only one kind of insect. Sometimes this has also been called the grain worm; whereby it becomes somewhat difficult to separate the accounts of its history and depredations from those of the *cecidomyia*, or wheat insect, described in the foregoing pages. It may, however, very safely be asserted that the wheat worm of the western part of New York and of the northern part of Pennsylvania is entirely distinct from the maggots of our wheat fly; and that it does not belong to the same order of insects. From the description of it, published in the sixth volume of "The Cultivator," page 43, by Mr. Willis Gaylord, this depredator appears to be a caterpillar, or span worm; being provided with 12 feet, 6 of which are situated near each extremity of its body. Like other span worms, or geometers, it has the power of spinning and suspending itself by a thread. Mr. Gaylord says that it is of a yellowish-brown or butternut color; that it not only feeds on the kernel in the milky state, but also devours the germinating end of the ripened grain, without, however, burying itself within the hull; and that it is found in great numbers in the chaff, when the grain is threshed. He says, moreover, that it has been known for years in the western part of New York; and that it is not so much the new appearance of this insect, as its increase, which has caused the present alarm respecting it. The transformations, and the appearance of this insect in its perfected state, have not yet been described. Mr. Nathaniel Sill, of Warren, Pennsylva-

nia, has given a somewhat different description of it.* On threshing his winter wheat, immediately after harvest, he found among the screenings a vast army of this new enemy. He says that it was a caterpillar, about three-eighths of an inch in length when fully grown, and apparently of a straw color; but, when seen through a magnifier, was found to be striped lengthwise with orange and cream color. Its head was dark brown. It was provided with legs, could suspend itself by a thread, and resembled a caterpillar in all its motions. This insect ought not to be confounded with the smaller worms found by Mr. Sill in the upper joints of the stems of the wheat, and within the kernels, until their identity has been proved by further observations. It appears highly probable that Mr. Gaylord's and Mr. Sill's wheat caterpillars are the same, notwithstanding the difference in their color. Insects of the same size as these caterpillars, and of a brownish color, have been found in various parts of Maine, where they have done much injury to the grain. Unlike the maggots of the wheat fly, with which they have been confounded, they remain depredating upon the ears of the grain until after the time of harvest. Immense numbers of them have been seen upon barn floors, where the grain has been threshed; but they soon crawl away, and conceal themselves in crevices, where they probably undergo their transformations. Mr. Elijah Wood, of Winthrop, Maine, says that the chrysalis has been observed in the chaff late in the fall.† A gentleman from the southern part of Penobscot county informs me that he winnowed out nearly a bushel of these insects from his wheat in the autumn of 1840; and he confirms the statements of others, that these worms devour the grain when in the milk, and also after it has become hard. In the autumn of 1838, the Rev. Henry Colman observed the same insect in the town of Egremont, in Bershire county, Massachusetts. It was separated from the wheat, in great quantities, by threshing and winnowing the grain.‡ These wheat worms, (or wheat caterpillars, as they ought to be called, if the foregoing accounts really refer to the same kind of insect,) are supposed, by some persons, to be identical with the clover worms, which have been found in clover in various parts of the country, and have often been seen spinning down from lofts and mows where clover has been stowed away.§ A striking similarity between them has been noticed by a writer in the "Genesee Farmer."|| Stephen Sibley, Esq., informs me that he observed the clover worms in Hopkinton, New Hampshire, many years ago, suspended in such numbers by their threads from a newly gathered clover mow, and from the timbers of the building, as to be very troublesome and offensive to persons passing through the barn. He also states that, if he recollects rightly, these insects were of a brown color, and about half an inch long. I am sorry to leave the history of these wheat worms unfinished; but hope that the foregoing statements, which have been carefully collected from various sources, will tend to remove some of the difficulties wherewith the subject has been heretofore involved. The contradictory statements and unsatisfactory discussions that have appeared in some of our papers respecting the

* "The Cultivator," vol. vi, p. 21.
† "New England Farmer," vol. xvii, p. 73.
‡ "Second Report on the Agriculture of Massachusetts," p. 99.
§ "New England Farmer," vol. xvii, p. 73.
|| "New England Farmer," vol. xvii, p. 164.

ravages of these worms and the maggots of the wheat fly might have been avoided, if the writers on these insects had always been careful to give a correct and full description of the insects in question. Had this been done, a crawling worm or caterpillar, of a brownish color, three-eighths or half of an inch in length, probably provided with legs, and capable of suspending itself by a silken thread of its own spinning, would never have been mistaken for a writhing maggot, of a deep-*yellow* color, only one-tenth of an inch long, destitute of legs, and unable to spin a thread. When the transformations of the former are known, and the insect is obtained in its winged or perfected state, it will undoubtedly turn out to be a very different creature from the tiny orange-colored wheat fly. Until its transformations are ascertained, it will be of little use to speculate on the means to be used against its ravages.

No. 3.

Observations by General Harmon.

VARIETIES OF WHEAT.

The culture of wheat has called forth the attention of the agriculturist in the temperate zones more extensively than any other grain.

The *varieties* have been extensively multiplied; each variety has its advocate. The varieties cultivated three thousand years ago appear to have been much inferior to some of the varieties of the present day. The quantity was probably greater than that obtained from some of the most valuable varieties of the present time; but the grain was coarse, containing much less of the essential qualities of good wheat—gluten and starch. The varieties cultivated at the present day appear to have as great a difference in their quality as there was between that cultivated before the Christian era and the present time.

White flint.—The origin of this valuable variety is not certainly known. It is claimed that it was introduced into New Jersey from Spain in 1814; and from thence spread through many of our wheat-growing districts. It is likewise claimed to have been brought from the Black sea into New York about the same time. The supposition that it originated in the town of Rome, Oneida county, in this State, where it was called "mud flint," from having been found growing on muck soil, is not entitled to serious consideration. Its first appearance in western New York was about twenty-five years since. The strongest probability is, that it was first brought from the Black sea into this State. Its origin is of less importance than the proper appreciation of its value to the cultivator. It is generally acknowledged to be one of the most valuable varieties that has been introduced to the wheat-growers of the Northern States.

Description.—The chaff is whiter than in most varieties. A few short and soft beards are found in the upper end of the heads, which are inclined to droop somewhat like the heads of barley. The straw may be said to be of medium length, and not as large as the straw of the common varieties. At the root it is more solid, and of a wiry appearance—being more stiff, and not as subject to lodge as when it was first introduced. The heads are not long, but generally well filled with from thirty to forty kernels in each head. The kernel is of a white flinty appearance, and very

solid, with a thin bran; the berry is of good size; the straw is very white, and of a bright appearance—having less leaf on the straw than any other variety I have had under cultivation. There is one peculiarity about this variety, not met with in any other with which I am acquainted—that is, the tenacity with which the berry adheres to the chaff in its chamber. It must be very ripe to waste by shelling when cut; and when threshed, but little of the chaff is separated from the straw. The only objection to this variety, when first introduced, was, that it was difficult to tread it out with horses, or beat it out with the flail; and then the white caps adhered so closely to the kernel, that it was frequently complained of by the millers. But, on the introduction of threshing machines, this objection was entirely removed; for, in passing through the machine, the chaff is completely torn from the berry. That which was formerly a strong objection is now considered a decided advantage, as it does not suffer by standing until it is fully ripe, and gives the wheat grower more time to secure his crop without loss.

When it was first introduced, it was mostly sought for to sow after corn, or on land not well prepared, and on thin and light soils—seldom being affected by the frost of winter, except on some bleak points where the snow is off most of the winter, or where the snow would blow on and remain in heavy drifts till late in the spring—where, in fact, no variety that we have introduced could succeed.

This variety has withstood the Hessian fly better than any other now cultivated. The solidness of the straw at the root gives the fly less chance of destroying it, as it is not as easily eaten off when the berry is filling—the time when wheat is most injured by the fly. Some of the stalks of this variety will be so eaten as to fall down, yet mature the berry; while, in other varieties, after it has fallen from the injury of the fly, the greater part of it fails to mature.

The hard and flinty berry is not easily affected by the rains, and it is, consequently, less subject to "grow" from exposure in an unfavorable harvest than other varieties. I have never known it to grow while standing in the field, and seldom while standing in the shock; but when committed to the earth, it vegetates very readily. Some have supposed that, by threshing it in a machine, many kernels are injured so that they will not vegetate. I have frequently threshed a few bushels with a flail, and sown it side by side with that threshed with the machine, and have not yet become satisfied that the threshing with the machine has proved injurious to wheat intended for seed.

The amount of seed, and time of sowing.—There is some difference in opinion as to the quantity required to be sown to the acre. First, we must take into consideration the soil, its quality, (for on that much depends,) and the time of sowing. On clay loam soils, the first week in September is the best time for this section of the State. It is important to have it take a good root before winter; and, if sown earlier, the fly is very apt to destroy some of it in the fall; and if it should be so large as to nearly cover the ground the last of October, it should be eaten off by cattle or sheep, as it is less liable to be injured by deep snows. Here one bushel of seed to the acre is as good as more on soils in good condition; if sown ten days later, add one peck more seed per acre. On sandy, gravelly loams, the second week in September is the time most favorable

for sowing; if earlier, the fly is very apt to affect it, so as to diminish the crop. Wheat, on such soils, appears to suffer more from the fly than on clay soils. On these soils, one bushel per acre; and, if the soil is not in good condition, one peck more should be sown. The white flint spreads, or tillers, more than the common varieties; and, when I have sown a bushel and a half, the second week in September, it was too thick—the straw fine, the heads short, and the berry not as large and fine as it would have been if one peck less had been sown to the acre. There is one advantage in sowing thick on soils where it is subject to be affected by rust; it will ripen two or three days earlier. That is an important consideration on soils unfavorable to the early ripening of wheat.

The yield per acre.—While this kind of wheat has been generally received with great favor, as one of the most productive varieties, the shortness of its head has, by some, been thought an objection. I believe the head is as large, in proportion to the size of the straw, as the other varieties. The amount per acre here, on common soils, is from twenty to twenty-five bushels; it frequently exceeds that on strong soils, and, in some instances, has reached thirty, thirty-five, and forty bushels per acre. In one instance, in this town, twelve acres produced 648 bushels, being fifty-four bushels to the acre; and the greatest yield ever known in this county, $68\frac{43}{60}$ bushels per acre, was from seed one-half white flint, the other half of red-chaff bald.

Its quality.—This variety is held in high estimation wherever it has been introduced. The millers give it the preference over all others. Its white flinty character and heavy berry make it tell in the half bushel; the pure wheat weighing from 63 to 67 pounds to the bushel. When cut before fully ripe, it is from one to three pounds heavier per bushel than when fully ripe.

The time of cutting.—To be the most valuable for the millers, wheat should be cut as soon as the berry has passed from its milky to its doughy state. Wheat cut then contains more of the gluten, and less starch; if suffered to stand till the berry becomes hard, the gluten is diminished, and the starch is increased, which reduces the quantity and quality of the flour; but for seed, it should never be cut till fully ripe. Starch is more valuable in its early vegetation than the gluten. One cause of the increase of smut, of late years, is the cutting of wheat intended for seed too green. Wheat cut before it is fully ripe should not be sown.

If wheat growers would adhere strictly to the sowing of no seed that is cut before it is fully ripe, they would find smut disappearing, without the preparation of brine and lime. The farmer that neglects to brine and lime his seed wheat does not look to his best interest. Smutty wheat is much improved by not cutting until fully ripe.

Quantity and quality of flour.—The white flint wheat is the most valuable variety that has been introduced into western New York, for the quantity and quality of its flour. Its soft mellow feel, and its richness, give it the preference over flour made from any other variety.

Improved white flint.—This is claimed as a new variety. It was obtained by careful selection from the best white flint, and sowing on a sandy gravelly loam soil, intermixed with limestone. The seed has been prepared by brining and liming. The berry has become larger, of more uniformity of size, bran very thin, and the flour the same as the white

flint. My seed wheat weighs 64 pounds to the bushel, and the yield of flour is superior to any other. Where I have sold for seed, it has universally been held in the highest estimation. The last three years, I have sold extensively for seed. The past year, I have had orders for it from seven different States, the District of Columbia, and Canada; and where it has been tried, it has given the greatest satisfaction. In August, 1842, I sold J. Cook, of Byron, Genesee county, forty-seven bushels for seed.

White Provence, from France.—Heads middling size and bald; chaff of a bluish cast; berry very large and white; bran thin; yielding flour well, and of a good quality. This is one of the most beautiful samples that I have had under cultivation. From its first coming up, it comes forward faster than any other variety I have seen—so much so, that it can be distinguished from all the others. The blades are larger and longer, spread more rapidly, producing more straws from a root; it stands the winter well, is not injured by the insect, and ripens four or five days before the common varieties, yielding well. In one instance, one peck was sown in October, after corn, on less than one-fourth of an acre, and the product was eleven and a half bushels of most beautiful berry—at the rate of forty-eight bushels to the acre.

The only objection I have to this variety is, it falls down more than any other. The straw is small, long, and soft, with heads large in proportion to the size of the straw, and well filled.

Old red chaff.—This variety was introduced into western New York more than forty years ago from the lower part of Pennsylvania, and for more than twenty years it was the favorite variety, and has produced some of the heaviest yields known in this vicinity. Red chaff, bald; straw long, seldom lodging; berry of a good size, and weighing from 60 to 63 pounds to the bushel; white, and bran thin, producing flour well, and of a superior quality. On new oak lands, it is now one of the best varieties that is sown; on old lands, of late years, it appears to have lost some of its former qualities, being more subject to rust and mildew. The insect attacks it more freely than some others, and it has suffered by severe winters. At present, it is not sown as much as formerly.

Kentucky white-bearded—better known in western New York as Hutchinson or bearded flint, or Canada flint—was introduced into Cayuga county by Mr. Hutchinson, and has been sown extensively for the last five years, and now is the favorite variety with many. The two years that I have tried it, it has not equalled the improved flint. On clay soils, or where wheat is late in ripening, it may be valuable, as it is supposed to ripen earlier than other varieties. With me, when sown on the same soils, and at the same time with my flint, it has not ripened any sooner. This is a white chaff bearded wheat; heads short and heavy, (it is called *club wheat* in some sections,) and well filled with a short, white, round berry, weighing from 60 to 65 pounds to the bushel. The berry, being short, packs close in the half bushel; yields flour of good quality, but will not come up to the improved flint. The bran is thicker and more brittle, and will not admit of being ground so close; if it is, the flour is more specky, exhibiting small particles of bran. If it is not cut before fully ripe, there is a loss in harvesting; for it shells very easily. Every touch of the long, stiff beard, shells it out. It stools or tillers out but little, requiring from one and a half to two bushels of seed per acre. The straw is stiff, and seldom lodges. On river flats and rich soils, where the common varieties would

lodge, this will not get down. Insects affect it more readily than they do some other varieties. The heaviest yield of wheat that I have heard of this year was from this kind. It is somewhat liable to smut, owing to its usually being cut green. The straw being thick, it matures more after it is cut than most kinds.

Indiana wheat.—This variety was introduced from the State that bears its name; white chaff, bald; berry white and large; bran thin; the berry not as flinty as the white flint, having more of the appearance of the improved flint; some of the best quality weighing 64 lbs. to the bushel, producing flour of superior quality and quantity; the straw is larger and longer than the white flint; ripens about three days sooner; shells easy, so that there is considerable loss if it remains in the field till fully ripe. It is well adapted to strong soils. On the farm of J. Cook, of Byron, it has averaged 30 bushels per acre for 10 years; but, with me, it has not proved as well as the flint. Its early ripening makes it valuable on late soils. This grain the insects have attacked more than the flint, and it is more liable to be winter killed.

Velvet beard, or crate wheat.—This is an English variety, and was introduced into western New York about 16 years since. This is a reddish chaff, bearded, with a large red berry. The straw is large and long; heads long, and well filled; long and *very* stiff beards; producing well on strong soils. It requires to be sown one and a half bushel to the acre, as it does not spread as well as some other kinds. It is sown mostly on the strong soils of the Genesee flats; being very hardy, and straw stiff, it is not subject to be thrown out by the frosts of spring. With its stiff straw, it seldom gets down. The berry is heavy, weighing from 60 to 64 lbs. to the bushel. It is 15 per cent. inferior to the white wheat in the quantity and quality of its flour. Flour made from this wheat is of a yellowish cast. It will admit of being sown the last of August—being seldom injured by the insects or strong soils.

Wheatland red.—This is a new variety, which I originated from the Virginia May. It is a red chaff, bald, heads of medium length, and well filled with a red berry, weighing 66 pounds to the bushel, and producing flour of good quality. This is a very hardy variety; straw of good size, and very bright; it has the quality of the Virginia May in its early ripening. It has stood our severe winters as well as the most hardy variety that I have tested. I believe it is one of the most valuable kinds that can be introduced on soils where other varieties are subject to rust. The four years that I have tested it, it has had no appearance of rust. Its red berry is objectionable. I know of no red wheat that is equal to the white in quality or quantity of its flour; the bran being thicker, and will not admit of being ground as close.

Golden drop.—An English variety; red chaff, bald, long straw, large and stiff; this is more hardy than most of the English varieties. The berry being red, bran thick, and not yielding flour equal to the common varieties, is a strong objection to its culture in this vicinity. I have given up its culture, believing it does not come up to many of the varieties I have had under cultivation.

Mediterranean.—This variety was introduced into Maryland, from the Mediterranean sea, six years since. It is a light-red chaff, bearded, berry red and long, very flinty, bran thick, and producing flour of an inferior quality.

In a communication from a wheat grower on the eastern shore of the Chesapeake bay, dated September 6, 1842, speaking of the wheat crop, he says: "The variety that has succeeded best here, this season, is the Mediterranean. It is a bearded wheat, and remarkably heavy; but the grain is about as dark as rye, and not plump. It ripens about ten days earlier than any other variety, and has escaped every disaster for several years."

From another from where it was first introduced: "It is a coarse red-bearded wheat, and makes inferior flour. Its only merit, in my estimation, is, that it ripens earlier, and is less liable to rust than any other variety."

This variety may prove valuable at the South; being seldom affected with the fly, and its early ripening is favorable on account of rust. Its long stiff beards, heads short, shelling very easy, (so much so that if it is not cut while in its doughy state, there will be a great loss,) and the inferior quality of its flour, are strong objections to its culture, where wheat of a superior quality succeeds well.

Blue stem has been cultivated in Virginia for about 33 years; white chaff, bald, berry white, weighs 64 pounds to the bushel; bran thin, and producing flour of superior quality. Formerly this was a red wheat; now it is changed to a beautiful white. Straw fair size, producing well. It is now one of the most productive varieties cultivated in Virginia. I am giving it a trial.

Italian spring wheat was introduced by Mr. Hathaway, of Rome, Oneida county, New York, and for several years was much sought for. For the last few years it has not succeeded as well as formerly, and is much less cultivated. This is a bearded wheat: white chaff, heads long, and the chambers standing apart more than the common varieties; berry red, long, not very full; bran thick, and flour of fair quality. Spring wheats are most valuable on soils where the winter varieties are thrown out by the frosts of the spring.

Tea wheat, or Siberian bald.—This is a spring wheat—one of the most valuable of the spring varieties. It is extensively cultivated in New England, and in the northern part of this State, [New York.] Straw not long, very bright, the heads bald, with a beautiful white berry, and producing flour of a good quality. The straw is not so large as the Italian, ripening earlier. The berry sits closer in its chamber, and is not subject to rust. I have cultivated it for several years. I have, however, rejected all spring varieties.

Black sea wheat was first introduced into the State of Maine, and has been successfully cultivated there for several years, as well as in some of the other New England States. It has succeeded the best of any of the spring varieties in Vermont: being earlier in maturing, it is less affected with the grain worm; seldom rusts or mildews. This is a white chaff, bearded; straw soft and very subject to get down, which does not injure it in filling; berry long and red, weighs well, bran thick, and producing flour of an inferior quality. Its early ripening gives it the preference to others.

I have received a description of several of the most valuable varieties of wheat cultivated in Virginia and the South, and had specimens of them forwarded to me; but they have miscarried. If I had succeeded in getting them, I would have given a description of them here. I hope to be more successful at some other time.

This list might have been much extended; but I have confined myself to such varieties as I have had under cultivation, or those that have come under my own observation.

No. 4.

From the Farmers' Cabinet.

BROADCAST AND DRILLED WHEAT.

At the present period, when the price of agricultural produce of every description is so reduced, it becomes of great importance to the farmer to look around and see whether he cannot increase the produce of his soil without increasing his expenses. This is particularly needful in raising wheat. From some causes, perhaps not well understood, the wheat crop has become, in the Eastern and Atlantic States, exceedingly precarious.

Our wheat, even when not attacked by enemies—such as rust or fly—has been gradually diminishing in the amount raised to the acre. The report of the Farmers' Club of New York states that the quantity has decreased there from 30 to 10 or 15 bushels per acre. This diminution is owing, probably, to the land being gradually robbed of the chemical constituents of the wheat, by sending the grain away, while we retain the straw to make food to supply succeeding crops; hence, if we put on enough of this kind of manure, we may raise large crops of straw, but not grain in proportion. And further, as if we thought we had yet too much grain, we have our manure yards so planned, that the saline parts (which are the most important in the formation of the grain, and which are soluble in water) have every facility to enable them to be washed away by repeated showers.

But is our present method of planting or sowing wheat the most likely to insure the largest yield? This is what I now wish to speak of. In the work of Jethro Tull, (the father of thorough tillage,) printed about one hundred years ago, he states that, while other farmers were sowing two or three bushels of wheat to the acre, and reaping only fifteen or twenty bushels, he drilled about half a bushel in three rows, about eight inches apart, in the middle of six feet wide lands, and usually obtained about 40 or 50 bushels per acre—and this without the aid of much or any manure. This success he attributed to tilling the land while the wheat was growing. He turned the furrow with what he called his hoe plough, alternately from and to the rows of wheat, like many who use the plough are in the habit of tilling their corn. In the spaces of eight inches between the rows, the ground was loosened by hand hoeing.

This plan, though not adapted to American farming, for the reason that, generally, we wish grass to follow our wheat crop, was yet deemed sufficiently plausible to determine us to give a fair trial to the drilling, in comparison with the broadcast plan. Accordingly, in the fall of 1843, our field (the clover being all ploughed under, and a light dressing of manure—about ten one-horse cart loads to the acre—being spread on the surface)

was nicely harrowed. We commenced at one side, sowed broadcast about six acres, with two bushels of seed to the acre. In about a week afterwards, we were furnished with a drill by our enterprising neighbor, John Jones, of Bohemia Manor, who owned the only wheat drill in the State of Delaware. Commencing on the 20th of the 9th month, we drilled about 27 acres, putting in about 10 acres a day, with one bushel and one peck of seed to the acre. The cost of the drill (including the services of one man and one horse) was 50 cents an acre, though two horses were required to work the drill. All the wheat, both drilled and broadcast, stood the winter well. To appearance, the broadcast looked best; it appeared thicker, both in the fall and in the spring. The drilled wheat by our neighbors generally was pronounced too thin, and was considered by them a failure.

In the 4th month the weather was very dry and warm, which seemed unfavorable for wheat. It appeared to stop it from stooling sufficiently, causing it to shoot up prematurely, and too thinly; but when the heads were formed, there was a manifest difference between the length of the drilled and the broadcast—those on the drilled wheat being decidedly longer. The whole crop was free from rust or fly, excepting along one head land, which had been eaten off by cattle when about one foot or 18 inches in height, where we found the fly in abundance—showing, certainly, that insects are most likely to attack those plants whose powers have been impaired; thus teaching farmers that the most likely way to avoid the fly, and even rust, is to keep their plants, by all known means, in as healthy a condition as they possibly can; for where one field of vigorous wheat will be destroyed by the fly or rust, ten will be which are either put in badly, or are too poor.

Previous to harvest, we had five acres carefully measured with the chain and compass, by W. Pennington, the surveyor of the neighborhood, assisted by John Jones.

The surveyor was present when the wheat was cradled, and saw that each acre had its due share. It was put away in separate mows, and threshed separately, and the grain all measured.

Nos. 1 and 2. Two acres of the broadcast surveyed together—
Two bushels of seed to the acre;
Seventy-five shocks;
Fifty-five bushels of wheat, or 27½ bushels to the acre.

No. 3. One acre drilled, adjoining the above; the land, if any different, rather inferior; treated exactly alike—
One bushel and one peck of seed to the acre;
Forty-two shocks;
Thirty-five bushels.

No. 4. One acre drilled, a little distant from No. 3—
One bushel and one peck of seed;
Forty-two shocks;
Thirty-five bushels.

No. 5. One acre drilled, a little distant from No. 4—
One bushel and one peck of seed;
Fifty shocks;
Forty bushels to the acre.

Here we see that, by the use of the drill alone, (the soil being in the

same, or perhaps an inferior condition,) the crop was increased 7½ bushels per acre, and, adding the amount saved in the seed, (3 pecks,) make 8 bushels and 1 peck to the acre; and further, that the amount of straw on the drilled acre, with a smaller quantity of seed sown, increased 12 per cent.; and the amount of grain on the same acre was increased more than 27 per cent.

It may be proper here to state, that the whole field (between 30 and 40 acres) was manured and treated alike; although, from causes existing previously in the soil, some parts of the land, being naked and barren, was more denuded than others. The surface soil, being washed away, did not yield as well as other parts. I suppose that, without the clover and manure, the field would not have averaged more than 3 bushels—certainly not 5 bushels to the acre.

The drill used was invented and made by M. Pennock & Sons, of Kennet Square, Chester county, Penn., the inventors of the revolving horse rake. Seven rows, about 8 inches apart, are planted by it at one time, about 3 inches in depth; the planters stand perpendicular; their points, projecting forward, produce small furrows, similar in shape, but deeper than those made by the teeth of the cultivator. The wheat, thus growing in the bottom of the furrow, is protected from the bleak winds of winter, and the fine earth, pulverized by the frosts, fills up the furrows by spring, and nourishes the young plants.

Our own convictions have been sufficiently strong upon the above experiment to cause us to purchase a drill, or, as it should be called, a wheat and corn planter—for it plants either equally well—for our own use; with which we have put in, this fall, the entire field of wheat, containing about 40 acres.

Respectfully,

CHARLES NOBLE.

PHILADELPHIA, 10*th month*, 1844.

P. S. The acre yielding 40 bushels of wheat, it will be seen, I have not compared with the broadcast in their per centage yield, because of their distance apart; supposing that the difference of yield might have been owing to some difference in soil.

No. 5—(1.)

From the Southern Agriculturist.

REPORT ON INDIAN CORN.

Your committee on Indian corn beg leave to report: We consider the corn crop as second to no other crop made in the United States; and in this State, the advantage of raising our own supplies would be of great importance, and would save to the State a large sum of money spent annually for corn. Under these circumstances, any improvements in planting or cultivating this valuable grain must be interesting. By a judicious use of the plough, and other good management, the crop may be much in-

creased; and, in a few years, a full supply for the State might be expected.

In the years 1838 and 1839 about 500,000 bushels of corn were imported; from October, 1841, to October, 1842, 360,000; and from October, 1842, to October, 1843, 260,000; showing an increase of the crop of the State of 100,000 bushels in one year. The increase may be attributed to the efforts made by Mr. Ruffin and others in recommending marl and other manures, and the proper use of ploughs.

All plants derive their nourishment from air, water, and soil; and the corn plant must have a supply of air and moisture to effect a full development of its growth; and the soil, to do its part, must be well manured and cultivated. Where the land has been long planted, there is frequently a hard subsoil crust, which must be well broken up by the subsoil plough, to enable the perpendicular roots to penetrate deep into the earth, to obtain moisture for the plants.

In preparing land for a corn crop, we would recommend that, in the early part of the winter, a furrow of 6 or 8 inches deep should be made with the common plough; that the subsoil plough should be run in this furrow to the additional depth of 10 or 12 inches; and that corn stalks and other manure should be put in this trench, and listed in, when thoroughly wet, with a small plough or hoe, as may be convenient; the land to remain in this state to the period of planting.

We cannot too highly recommend the use of the subsoil plough. By its use, the soil will be less wet after great rains, and more moist in great droughts. Mr. Delaplain informs us that, in 1823, he planted a field of 25 acres of corn; that in a part of the field he used the subsoil plough, and in the other part the common tillage. A furrow was made, with the common bar-share plough, 5 or 6 inches deep, and with the subsoil plough 7 inches deeper; that, in all other respects, the soil, planting, and tillage, were the same. In that part of the field where the subsoiler was used, the corn kept its color throughout the season, and produced 50 per centum more than the other; and where the common tillage was used, it suffered much from drought, and fired considerably.

Mr. C. M. Bement also states that he subsoiled a part of a piece of ground which he planted to Indian corn. The piece of ground was on a light loamy or sandy knoll; that he subsoiled it in strips, leaving alternate strips not subsoiled; all being manured alike. He ran the subsoiler from 8 to 10 inches deep. The season proved to be very dry. And where the subsoil plough was not used, the corn was so burnt up that it produced nothing; but where it was used, the corn remained green and flourishing through all the drought, and produced a good crop.

The soil must be moist at the time of planting, or a good stand cannot be expected. The seed corn ought to have been selected with much care in the field from those stalks bearing the greatest number of ears. And here we would recommend, in the highest terms, the use of the coal tar to preserve the seed from birds, &c. When the seed is well prepared by the use of coal tar and soot, and the soil well moistened by a good rain, to be planted at the distance of 3 feet; the rows being from 5 to 6 feet apart; and either one or two stalks should be left, according to the fertility of the soil. Where the soil is very rich, or highly manured, we think it best to plant at 2 feet apart, and to leave two stalks.

As soon as the corn is up, the plough ought to be used in breaking up and pulverizing the earth between the rows; and, when 5 or 6 inches high, the best ploughman ought to run a furrow as near as possible to the plant, (the bar side of the plough being next to it,) and the other ploughman may break up the intermediate space between the rows. At this period, the ploughing ought to be deep and close; breaking up and pulverizing well the soil. By porosity of soil, the air is admitted, and a larger quantity of organic and inorganic food for the plant is afforded.

In dry weather, the oftener the plough is used the better, until the corn is about one-third grown; after which, the plough ought to be laid aside, and the cultivator, or hoe harrow, used in its place. In wet weather, the plough ought never to be used. Corn is benefited at all periods of its growth by the application of manure on the surface over the roots. If the drought is great, and the corn far advanced towards maturity, the surface crust must be broken, and the earth stirred lightly, to admit air and moisture to the roots ; but care must be had not to disturb or cut the lateral or surface roots.

About the time corn is maturing, brace roots shoot out from the joints near the surface of the earth. These roots frequently strike deep into the earth, affording both nourishment and support to the plant. If a high hill has been made, these roots shoot out higher upon the stalk, where it is brittle, and likely to be snapped off the first high wind. If there be little or no hilling, the corn will bend and yield to the storm, and rise again, having sustained little or no injury. This would be particularly the case where the soil is very fertile and highly cultivated.

Well-grown corn has from 40 to 60 large roots extending from the joints under the ground, which, with the tap root, penetrate deep into the soil, if not obstructed by a hard subsoil. From these large roots innnmerable small fibrous roots shoot out in all directions towards the surface, extending across the rows 5 or 6 feet, in search of nourishment for the plant. The large perpendicular roots afford moisture, and the small fibrous roots food to the plant. The deeper the perpendicular roots penetrate the soil, the less injury the plant will sustain from drought. And the more the surface has been broken up and pulverized, the further the surface roots will extend in search of nourishment to mature fine and large ears.

No. 5—(2.)

For the American Agriculturist.

EXPERIMENTS IN PLANTING CORN.

During a short visit with which I was honored by your father (Mr. S. Allen) in August last, I showed him a field of corn, with which he was so much pleased, that he requested I would give an account of its product; which I promised to do through the American Agriculturist. The field lies northeast of my orchard, and adjoining thereto—a locality with which you are familiar.

When I purchased the plantation on which I now reside, in 1812, the field had been in cultivation, in one continued succession of corn crops, for

some 20 or 25 years. So soon as I could prepare the ground for the purpose, I put it in timothy meadow. As it lay adjoining my sheep-house, I permitted a small flock of my sheep, during the time they were fed, each winter, to run on it. I also applied to it the manure derived from my sheep-fold. In this way, in the course of 12 or 15 years, which I supposed it to remain in meadow, it was restored to its native fertility, being naturally as rich as the best Kentucky land. I now raised several crops of tobacco on the ground, when it was again put in meadow, and treated as above. For the last three or four years preceding the present, it has been in hemp.

Early in April of this year, it was all ploughed, and once harrowed, and laid off with great exactness 3½ feet each way. It was planted on the 13th of April, the ground being very light, and finely pulverized. The corn came up well, and in due time was thinned out to three stalks in a hill. It was carefully cultivated by ploughing alternately each way, with the common Kentucky shovel plough, and going over once with broad hoes. The season up to the 2d of July was tolerably favorable, though there was too much rain for a first-rate crop. The corn was now generally getting into silk. At this period, when corn requires much rain, or at least frequent showers, to cause the corn to *ear* well, a drought came on, and no rain fell for two weeks. During this period, the atmosphere was very dry and windy. The consequence was, that there was scarcely an instance of two ears being produced on the same stalk, and even the single ears were much reduced in size. Although, after a drought of two weeks, we had again a succession of light showers, yet they came too late to be of any material benefit to corn crops as forward as mine. Under these disadvantages, the yield fell greatly below what it would have been, had not the severe drought of July intervened.

Upon carefully measuring an acre of about an average quality of the field, the product was 77 bushels. I am convinced, that if a due proportion of rain had fallen during the first half of July, the yield would have been fifty per cent greater. The corn was of the white species—a medium between the flint and the larger kinds—which are more productive, but not so good for bread.

Permit me now to give you the result of another experiment, made during the present year, to ascertain the advantages of planting corn more closely than usual, recommended by some of our farmers, who have succeeded in raising very large crops under favorable circumstances. My experimental crop was planted on the 12th of April, (one day before that described above,) upon land which had been cleared in 1810, and preserved in its native state of fertility by a due proportion of grass crops. Its fertility was about equal to that described above, and was in a field lying on the same ridge, northwest of the rivulet you speak of running through my farm, in your November number, page 322 of your last volume. This field had been in clover for the two years preceding, and was ploughed up last fall with the view of putting it in hemp, and was consequently in fine condition for hemp or corn.

On one side of the field, I laid off, in an oblong square, four acres, each acre lying equally well, and of equal fertility. This ground was again ploughed early in the spring, and levelled with the harrow. It was now laid off the long way with great accuracy, 3½ feet from centre to centre, and then checked off the other way in rows: the *first* acre 4 feet apart, the

second acre 3½ feet apart, the *third* acre 3 feet apart, and the *fourth* acre 2½ feet apart. The whole was planted the same day; and, in due time, the three first acres were thinned out to three stalks in the hill, and the fourth acre to two stalks in a hill. The number of stalks in each acre, if none had been missing, would have been as follows:

No. 1, 3½ by 4 feet - - - -	9,335
No. 2, 3½ by 3½ feet - - - -	10,668
No. 3, 3½ by 3 feet - - - -	12,447
No. 4, 3½ by 2½ feet, two in a hill - -	9,956

This crop, of course, suffered equally from the drought with that above described, and, having more *outside rows*, was more depredated upon by the crows, and did not stand quite as well, or with such perfect regularity, as the other in the hills. Making the proper allowances for these causes, I did not calculate upon quite as large a product as from the other field. Upon gathering and accurately measuring each acre separately, I found the product as follows: No. 1, 68 bushels; No. 2, 69 bushels; No 3, 69 bushels; No. 4, 77½ bushels. Thus the acre planted 3½ by 4 feet produced nearly as well as that planted 3½ feet each way; and the latter produced the same quantity as that planted 3½ feet by 3 feet; and the acre planted 3½ by 2½ feet, and only *two* stalks in a hill, produced 8¼ bushels more than either of the others. From this experiment, it would seem that, in the best of ground, where *three* stalks are intended to be left in a hill, the distance each way should not be less than 3½ feet; and that, where it is intended to plant more closely, not more than two stalks should be left in a hill. The acre planted 3½ by 2½ feet produced decidedly the best; but it was too close one way to be ploughed with convenience. Thus planted, there were 8¾ square feet for each hill. If planted 3 feet each way, there would be nine square feet to each hill, and the distance would be more convenient for ploughing both ways. I incline to think that planting 3 feet each way, with two stalks in a hill, would be the most eligible for convenience and product. As a single experiment is not very satisfactory, I intend, if I am spared, to repeat the experiment next year on the same ground, laying it off one way 3 feet, and the other 4, 3½, and 3 feet; thinning the last to two stalks in a hill, and the other two acres to three stalks in a hill. In this last experiment, I planted the same kind of corn as in the other.

A. BEATTY.

PROSPECT HILL, *December* 1, 1844.

No. 5—(3.)

The Indian corn entered by Mr. Wadsworth for premium was one-quarter of an acre, selected from near the middle of a field of four acres. This field was planted with the "improved Dutton corn," about the 1st of May, in hills, three feet apart each way. The land on which it was planted was "sward ground" manured with common yard manure, at the rate of from twenty to thirty cart loads to the acre, turned over flat

and rolled, and the corn planted on the furrows. It was hoed four times, without hilling or turning up the furrows between the rows. The seed with which it was planted appeared to be a mixture of the common Dutton corn and a very large kind of eight-rowed corn, and the whole crop was comprised of a mixture of the two varieties, in about equal proportions; a bushel of each kind of which was laid before your committee for inspection. The ears of both kinds were very large and long—many of them measuring nearly, or quite, 14 inches in length. The kernels upon the eight-rowed were very large, and the cob small; the kernels on the twelve-rowed were also much larger than the common Dutton corn. And your committee are of opinion, that if Mr. Wadsworth will continue this cross-mixture for a few years, he will have a kind of corn far superior to any now in use. On this field of corn, the suckers were all allowed to remain until the customary time for cutting the stalks. The product of that portion of the field entered for premium was at the rate of 151 bushels and 18 quarts to the acre. Your committee are aware that it hardly seems possible that so large a quantity could be raised from an acre in this old hidebound State of Connecticut; yet, from the certificate of the town committee of Durham, and from the statement of Mr. Wadsworth, under oath, such was proved to be the fact. Think of this, ye farmers of Middlesex county! One hundred and fifty-one bushels and eighteen quarts of shelled corn from one acre!! This eclipses even the far-famed corn regions of the great valley of the West. With facts like this before their eyes, our young farmers, we think, will hardly feel disposed to quit the healthy home of their sires, to seek a fortune among the Wolvereens and Hoosiers of the Western prairies, but be content to settle down amid the hills and dales where dwell the lovely lasses of our own dear Yankee land.

In competition with the foregoing, was a quarter of an acre of eight-rowed corn, entered by Joel M. Clark, Esq., of the society of Westfield, in Middletown. This corn was raised on greensward land, ploughed plain, and rolled. Two coats of hog-pen manure were applied. One coat, being coarse, was put upon the land and ploughed in; the other was fine manure, placed upon the top after the field had been ploughed, and harrowed in. The whole amount of manure used was about 65 "cart buck loads" to the acre. It was planted about the 20th of May, four kernels in a hill, hills three and a half feet by two and a half apart. The soil is a gravelly loam. The seed was rolled in plaster of Paris before planting; and, if your committee are not mistaken, the suckers were all removed from the hills about the time of the last hoeing. The product of that portion of the crop which was entered for premium was at the rate of 108 bushels and 4 quarts to an acre, which every one must admit to be a very extraordinary yield; and the committee regret exceedingly that the rules of the society will not admit of a premium being awarded. The quality of this corn was superior, in the opinion of your committee, to any exhibited. The kernels were large, and the ears well filled, but too short to be very productive under ordinary circumstances.

Respectfully submitted, by order of the committee.

HENRY D. SMITH, *Chairman*.

No. 5—(4.)

Bridgeport, *January* 18, 1845.

Dear Sir: I have the honor to acknowledge the receipt of your communication of the 16th instant, and hasten to make a short reply to your inquiries relative to the amount of corn raised per acre on my farm.

First, the mode of culture.—I invariably turn over with a heavy subsoil plough, in the early part of November, some 8 to 10 acres of old meadow land, and roll the furrows down with a heavy roller; leaving the frost during the winter to destroy all vegetation for weeds, &c., and the following spring cross-plough it well, and harrow it twice.

Second.—The manure I make consists of one-third creek mud, or decomposed vegetable matter, one-third stable or barn-yard manure, one-third unslaked fine lime, taken from the bottom of the kiln.

Thirdly.—In planting, I never use more than five grains of the best selected corn for the hill; and as the plant shows itself through the ground, we invariably use unleached ashes on the outside of the young plants; thereby allowing the action of the moisture of the atmosphere, or rain, to run the leached substance to the root of the plants. In pursuing this course, I find, on the first cleansing, that but a few, if any, (so called,) *nubbins* show themselves. Again, I have, from experience, found it unnecessary to *hoe* my corn *three* times. All that is necessary to make it propagate well is to keep it clean from weeds, and let the bracers or holders strike well into the ground. I have in the hill tried *hen dung;* and unless very great care is taken to use but about a gill to the hill, it will assuredly destroy all growth.

Fourthly.—I plant from three to four feet apart, and have never failed to raise from each hill from four to seven well-grown ears. In the summers of 1842 and 1843 I planted nine acres of corn—one-half Long Island yellow, and one-half Long Island white. We had a contest at our agricultural society; and feeling, as I did, that my competitors were behind me, I called in a sworn surveyor; he measured two acres, one of white and one of yellow; and with the aid of my men it was gathered, and under his supervision correctly measured. The result was—the white gave per acre of well-grown ears 236 bushels; the yellow, on the same ground, 224 bushels of ears to the acre; and this result took the first premium at our society. Again: the present year, I had on low cold ground about eight acres of corn, arranged and planted similar to my statement above. The result is, that it yielded $121\frac{1}{10}$ bushels of shelled corn per acre. I am certain that our old State of Connecticut contains thousands of acres of unimproved lands, that, with proper culture, will yield as much or more than what is denominated the fertile lands of the West.

Again: I find that the land of this State is ill calculated for the culture of *oats;* and, in lieu thereof, I have substituted barley, which yields a fraction more in quantity to the acre than will the best of oats; and it will weigh per bushel about 47 to 54 pounds; and the straw is of greater value for all purposes than any other; and I may, with truth, remark, that it does not reduce the strength of the soil so much as oats, by at least some 20 per cent. You would really do our old stubborn farmers of Connecticut an essential service, by urging them to vary their culture, not only in their land, but every description of their stock. On the bottom lands of

the State, lying on the sound, there is no necessity for complaint, for the yield will well compensate the husbandman. The great difficulty arises from the almost entire impracticability of improving the ideas of our old farmers to any thing that promises the smallest advantage or improvement.

Lime, with the decomposed vegetable matter taken from our creeks, forms a valuable manure, and is at the command of almost every farmer in this vicinity. The use of plaster is given up on our grounds here, owing to the atmosphere being too salt for its use. My timothy meadows yielded me last year an average of 3¼ tons per acre; and if the ensuing summer should be more moist, I hope to have 3½ tons to the acre.

As you requested, I have given you a hasty scrawl; but I beg you to be assured that there is no difficulty in producing in our vicinity rising 125 bushels of shelled corn to the acre, but care must be taken to produce it.

With sentiments of regard, yours, &c.

VERDINE ELLSWORTH.

Hon. H. L. Ellsworth.

No. 6.

RESEARCHES ON THE SALINE MATTERS OF GRAIN.

The researches made on several cereal grains, and on other seeds, demonstrate the existence of certain saline matters, which are essential to the formation of those seeds, and on the presence of which their nutritive properties, in a measure, depend.

Indian corn.

When this grain is burnt to ashes in a platina capsule, it is found difficult to burn out the last traces of carbon; for the fusible phosphates and free phosphoric acid envelope the particles, and prevent the admission of the oxygen of the air to the carbon.

While engaged in the agricultural survey of Rhode Island, one of my pupils accidentally converted the bottom of a platina capsule into a brittle phosphuret of that metal, by the action of the carbon of the grain on the phosphoric acid at a high temperature—the reduced phosphrous combining with the platina. This accident led to the discovery of a volatile base in the grain, and to a series of interesting researches on the saline matters.

On burning 100 grains of brown corn, one grain of ashes remained, and was found to consist of phosphates of lime and magnesia, with a little silica, potash, and phosphoric acid.

Shepard obtained, by combustion of Indian corn, 0.95 grain of ashes, but no free phosphoric acid. He states the composition of these ashes as follows:

Silica	38.45
Potassa, (with traces of soda)	19.51
Phosphate of lime	17.17
Phosphate of magnesia	13.83
Phosphate of potassa	2.24
Carbonate of lime	2.50
Carbonate of magnesia	2.16

Sulphate of lime and sulphate of magnesia - - -	0.79
Silica, mechanically present - - - - -	1.70
Alumina traces, and loss - - - - - -	1.65
	100.00

The quantity of ashes operated upon is not stated, and the processes are not given, excepting those of incineration, in which he failed to form a phosphuret of platinum, which was owing to the free admission of atmospheric air, and of combustion at a low temperature. By burning off the carbon with nitric acid, free phosphoric acid may be be readily obtained, as in my experiments.

The chit, or that part of the grain containing the germ, being dissected out, and analyzed separately, was found to contain a still greater proportion of the phosphates—100 grains of the "chit" yielding 6.4 grains of very fusible ashes, which consist of—

Phosphate of lime - - - - - - -	2.4
Phosphate of magnesia - - - - - -	0.8
Phosphoric acid, a little potash, silica, and oxide of iron - -	3.2
	6.4

It is evident that the salts are most abundant in this portion of the grain. This was confirmed by an observation made by Mr. A. A. Hayes, who remarked that sulphate of copper colored green the chit and germ only, thereby beautifully defining the limits of the phosphates in the grain, by the formation of phosphate of copper, which thus pointed out the limits of the phosphoric acid.

This ingenious method I have since applied to the examination of the seeds of all our usual plants, and to tubers, roots, and stems of recent vegetables.

By soaking any seed, after it has been cut open, in a watery solution of sulphate of copper, or blue vitriol, this experiment may be repeated; and the result will give decisive proofs of the presence of phosphoric acid in all but the oily seeds, which do not admit of this test.

A grain of Indian corn, split open longitudinally, and thrown into a solution of sulphydrate of ammonia, the "chit" is soon changed to a dark olive color, which arises from the change of the salts of iron into a sulphuret of that metal. A black-colored matter, forming with the ammonia, turns the vegetable coloring matter yellow, and the two colors combined produce an olive. This experiment was made first by Mr. Hayes, and has been applied by me to every common grain and seed.

I then prepared specimens of grain, by means of tincture of iodine, so as to point out the limits of the starch and dextrine—the tincture of iodine striking an intense blue with starch, and a deep port wine red with dextrine; so that, from this test, a rich violet indicated the presence of both starch and dextrine in grain. If the oil is extracted from the transparent horny part of corn by alcohol or ether, the tincture of iodine will indicate the presence of starch in that part of the grain associated with the gluten. By these means, we may easily cause any grain to point out the extent and precise

limits of each of its ingredients, and, by the eye, we can form a pretty correct estimate of their relative proportions in different seeds. This beautiful application of chemistry being new, and nothing having yet been published on the subject, (excepting what I have stated to the American Association of Geologists and Naturalists, or have given in the form of lectures before agricultural and other societies,) I have had a colored lithographic drawing made from my specimens, and present it to the public in this report.

It is my intention to publish hereafter a more full account of the chemical method of testing plants, with some physiological researches on germination; but the experiments require much time, and are not yet fully completed.

Among the curious results of these experiments, is the proof that the relative proportions of phosphates in grain depend on the appropriating power of each species or variety; for an ear of corn being selected which had on it two different kinds, (viz: the Tuscarora and the sweet corn,) and these seeds being split in two, and immersed in the same solution, soon gave evidence of more than double the amount of phosphates in the sweet corn than in the other variety. Now, since the kernels came from the same ear, and grew side by side, they obtained unequal quantities of phosphates from the same sap, derived from the same soil. A crop of sweet corn will take twice as much of the phosphates as the other variety, and, consequently, will sooner exhaust the soil of them; and, also, if the soil is deficient, will require more phosphates (*ex. gr.* ground bones) to be added. (See fig. 6, Tuscarora, and fig. 10, sweet corn.)

Some interesting facts will also be noticed in the variable proportions of phosphates in different varieties of the same species of grain, and the great preponderance of them in Indian corn, beyond what is contained in the smaller grains, like barley, oats, and wheat—a fact that seems to explain their peculiar properties as food for animals; the more highly phosphatic grains being more likely to surcharge the system of adult animals with bony matter, producing concretions of phosphate of lime, like those resulting from gout.

Perhaps that stiffness of the joints, and lameness of the feet, common in horses fed too freely with corn, may be accounted for by this preponderance of the phosphates. Young animals cannot fail to derive more osseous matter from corn than from other food.

Agriculture may learn something from these researches; for they indicate the relative power which each kind of grain possesses in appropriating the phosphates contained in the soil, and consequently its wants.

Buckwheat and oats contain the least proportion, and may be raised on soil which is not fully supplied with phosphates.

Beans and peas are highly charged with the phosphates of lime and magnesia, while they contain but very little starch. They also contain salts of iron, as indicated by the alteration of their white color to a dirty olive green. Both the cotyledon and the germ are charged with all these salts, but the epidermis or skin of the bean or pea is free from them.

Relative proportions of starch in grain.

Tuscarora corn contains the most. (Fig. 5 represents the natural appearance of the grain when it is cut open; fig. 6 shows, by the iodine test

changing it to a violet, that starch and dextrine form the entire mass of the grain, excepting the chit and germ.) Rice corn and pop corn contain the least starch. The other figures sufficiently explain the relative proportions of all the ingredients of the grain they represent.

Relative proportions of oil and gluten.

Rice corn contains the most oil; pop corn, Canada corn, and brown corn, rank next. Burden corn is charged with a very fine white oil; Tuscarora corn does not contain oil or gluten. It will be remarked that there is a great difference in the mode of distribution of the oily and glutinous parts of corn; the Southern variety always having it on the sides of the elongated seed, while the starch projects quite through the grain to its summit, and, by its contraction in drying, produces the peculiar pit or depression in this variety of grain. The Burden corn is still more remarkable for this arrangement.

Popping corn.

The oil in the horny portions of the grain is contained in little six-sided cells, in the form of minute drops, visible in a thin section under a good microscope. When a grain of corn is heated to a temperature sufficient to decompose the oil, a sudden explosion takes place, and every cell is ruptured by the expansion of gaseous matters arising from the decomposition of the oil, and the grain is ruptured at the weakest point in the arch, and is completely evoluted and folded back. Now, on examining the cells again, they will be found lacerated and swollen much out of shape.

If an attempt is made to pop Tuscarora corn, it will be found never to succeed; hence, I was able to prove that this curious phenomenon, so familiar to every child, though never understood by its parents, is due entirely to the decomposition of oil, and the formation of carburetted hydrogen gas, such as is sometimes used in lighting large cities.

This change in the corn is one of considerable importance, so far as regards facility of digestion; for it is much more digestible by man after this decomposition and extrication of the oil, though not so fattening to animals that can digest oil. The use of oil in corn is obviously to prevent the rapid decomposition of the grain in the soil, and to retain a portion of food until needed by the young plant, and is always the last portion of the grain taken up.

It serves to keep meal from souring readily; and it will be observed that flint corn meal will keep sweet for years, even when put up in large quantities; but the Tuscarora meal will sour in a short time. The latter is the most digestible grain for horses, and is soft; but is of little value for feeding swine. It is a good kind of grain for rapid cooking, for its meal is quickly boiled or baked.

Oily corn makes a dry kind of bread, and is not adhesive enough to rise well without admixture of rye or flour. Rice corn is so dry that, alone, it will not make bread, but is dry like sand.

Oily grains are excellent for fattening fowls; and the rice corn, both from its size and oily nature, is admirably adapted for them.

Corn is sometimes raised for the manufacture of whiskey, and the oil is saved during the fermentation, since it separates and rises to the surface. I have been informed that 100 bushels of corn yield from 15 to 16 gallons of oil. It is made on the borders of Lake Ontario, and has been used in the light-houses on the lake.

According to my analysis, the proportions of oil in Indian corn vary from 6 to 11 per cent.—the latter being the yield from Canada corn; while rice corn contains still more, but has not been fully examined.

Southern corn has more starch and less oil than our Northern flint corn, and is much softer and better food for horses, though not so fattening for swine or poultry, and is, when ground, more apt to become sour.

When Indian corn is hulled by means of potash lye, the oil next to the epidermis of the grain is converted into soap, and the epidermis is detached. The caustic alkali also liberates ammonia from the mucilage around the germ.

Sweet corn appears like an unripe grain. Its origin is unknown; but it appears to have been used by the aboriginal inhabitants of New England anterior to the settlement of the country by the pilgrims. It is a remarkable variety of corn; containing, as before observed, an unusually large proportion of the phosphates, and a large quantity of the sugar and gum, with but little starch. Its excellence for food in its green state is well known and appreciated; and having stalks which are short and slender, they of course take up a less proportion of the saline matters of the soil.

The colors of Indian corn depend on that of the epidermis, or hull, and of the oil; the latter, when yellow, showing its color through a transparent epidermis; while, if the hull is colored and opaque, the grain presents the same color.

In the Rhode Island white flint, (a favorite grain in that State,) the oil is transparent and colorless; and the epidermis is likewise free from color, and is nearly transparent: hence the meal is white; and the quantity of oil being large, it is less liable to ferment and become sour than some other varieties, and is in very good repute.

The yellow color of the golden Sioux, a twelve-rowed kind of corn, is due to the color of the oil.

Brown corn has a darker color, dependent on the combined colors of the oil and epidermis.

Red and blue corn owe their lively hues to the colors of the epidermis, and not to the oil.

On inspecting very thin slices of corn by the aid of the microscope, the epidermal coat is found to be made up of hexagonal cells; sometimes much elongated, and much larger than those of the glutinous and oily parts of the grain.

The starch globules are seen distinctly in the starchy part, and are smaller than those of the potato, and are much more rounded. A drop of diluted tincture of iodine brings out their forms and character most beautifully.

No crystals of saline matters are seen in the grain; but the phosphates are probably in the state of a fine powder, while the ammonia is, in combination with the organic matters, forming a kind of *amide* in the mucilage around the germ.

Indian corn, according to the analysis of Mr. Payen, consists of the following ingredients:

100 parts by weight yielded—

Starch	28.40
Nitrogenized matter	4.80
Fat matter, (oil)	35.60
Coloring matter	0.20
Cellular tissue	20.00
Dextrine	2.00
Various salts	7.20
	98.20

The proportion of oil is evidently overrated in this analysis; and the error is due to the solubility of the zein, or gluten of Indian corn, in ether, which Payen used to dissolve the oil. The gluten, being taken up in this process, was mistaken for oil, and credited in the analysis as such, when it should be put under the head of nitrogenized matters.

It is not surprising that M. Dumas, in quoting this analysis, should observe that "individuals who eat corn for some time present symptoms of an accumulation of fat in their tissue, which will not appear astonishing when we consider that a bushel of corn would yield a quart (litre) of oil!" Our New England farmers, then, ought to be an excessively fat people, according to this theory, if they did not work it off into hard muscular fibre.

Dumas says, that the popping of corn is due to the conversion of the water contained in the starch into steam; which I have shown to be an error, and proved this phenomenon to arise from the rupture of the cells of the glutinous part of the grain, by the conversion of the contained globules of oil into gas.

Indian corn is not sufficiently well known in Europe, and is not properly valued. In England, the climate is not sufficiently warm in summer to allow it to ripen; but green corn can be abundantly raised, and, if known, would be valued as a luxury. In the south of France, and in Venetian Lombardy and in Tuscany, abundant crops of Indian corn are raised; but it is used only by the poorer classes, and for feeding cattle—absurd prejudices having prevented its use among the higher classes of the people.

"All animals that are exclusively carnivorous will eat Indian corn, and generally prefer it to other grain." It certainly is, in the highest degree, nutritious.

The cultivation of corn gives a peculiar character to New England husbandry—it being a hoed grain crop, unknown in England.

A grain of corn is a fruitful topic, and might profitably occupy a large space on these pages; but what has already been stated may serve to show the degree of interest attached to a single agricultural product, and convince agriculturists that they have abundant objects of study around them.

It is obvious that the ingredients above described as components of corn are all essential to a highly nutritious grain.

The gluten and mucilage contain nitrogen—an element essential to the formation of fibrous tissue, muscles, nervous matter, and brain.

The oil is nearly formed fat, easily convertible into animal oils by a slight change of composition.

Starch is convertible also into fat, and into the carbonaceous substances of the body, and, during its slow combustion in the circulation, gives out a portion of the heat of animal bodies; while, in its altered state, it goes to form a part of the living frame.

Sugar acts in a similar manner, as a compound of hydrogen, oxygen, and carbon.

From the phosphates, the substance of bone, and the saline matters of brains, nerves, and other solid and fluid parts of the body, are in a great measure derived.

The salts of iron go to the blood, and there constitute an essential portion of it, whereby it is enabled by successive alterations of its degree of oxidation during the circulation through the lungs, arteries, extreme vessels, and veins, to transport oxygen to every part of the body.

These remarks apply also to the other cereal grains, and in part to leguminous seeds.

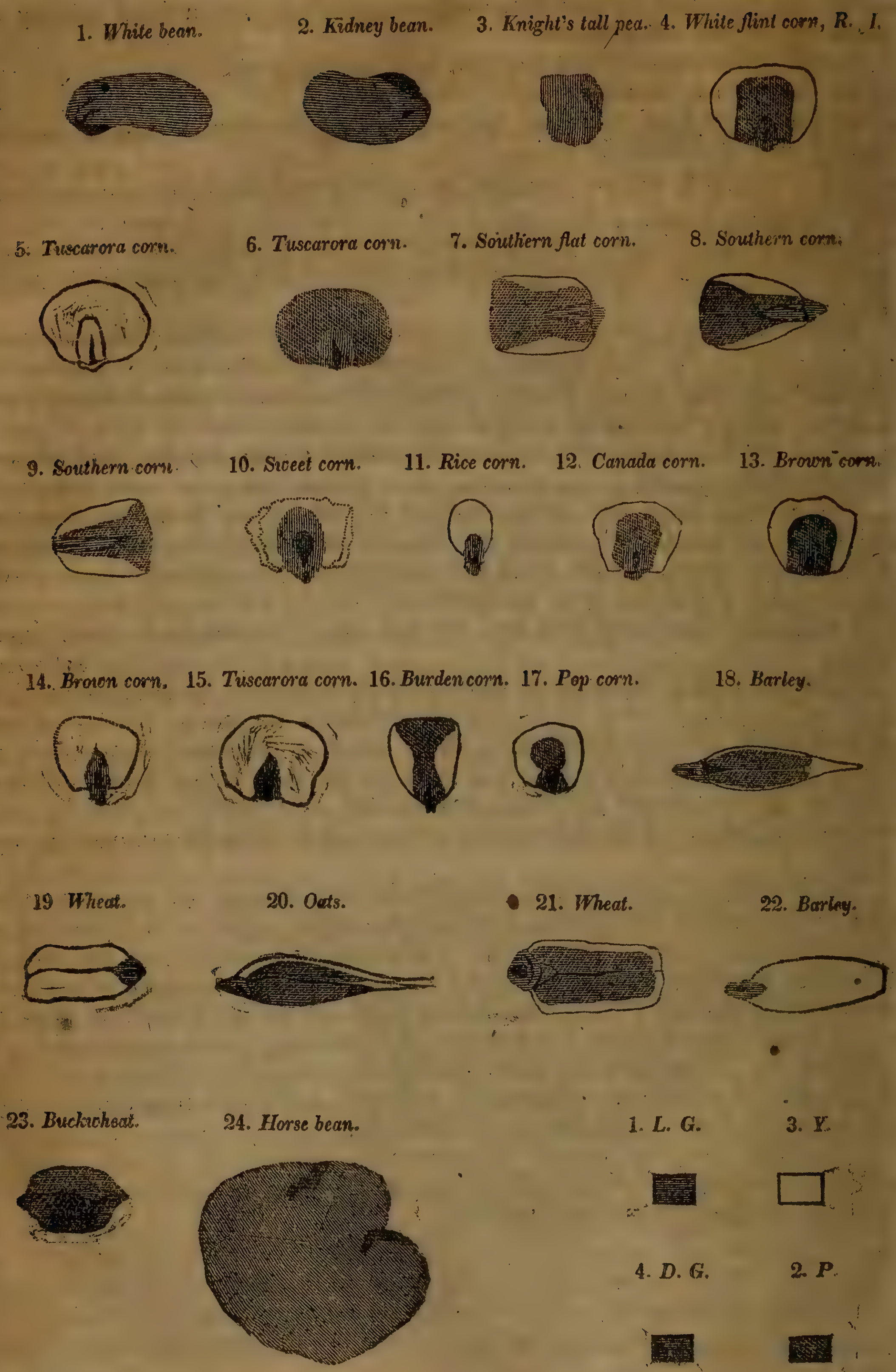
It is evident, then, that grain contains all the elements required for the perfect development and support of the bodies of animals; and that even when we consume animal food, we obtain the same ingredients, some of which are presented in a more concentrated form; but they were all originally derived from vegetables, and are but little changed in nature in animals.

From the modern researches of French chemists, it is evident that "flesh is grass" in a more strict sense than was formerly supposed; Dumas having demonstrated that vegetable fibre is of the same composition as animal fibre; vegetable albumen identical with animal albumen; caseine, or the basis of cheese, also of the same composition as legumen of beans, peas, and other plants; while, at the same time, a kind of cheese was made from beans.

The identity of composition of vegetable and animal proximate principles leads to some remarkable conclusions; and it is now laid down by the French chemists, that plants are the exclusive producers of the proximate principles common to both them and animals; and that animals never produce any of them, but only appropriate those previously formed by plants.

"Plants," says Dumas, "are organs of reduction; animals are organs of combustion. *Vegetables* produce neutral nitrogenized matters, fat matters, sugar, starch, and gum; decompose carbonic acid gas, absorb heat and electricity, and are an apparatus of reduction.

"Animals consume neutral nitrogenized matters, fat matters, sugar, starch, and gum; produce carbonic acid gas, give out heat and electricity, and are an apparatus of combustion."



1. *L. G.*—Represents phosphates.
3. Y.—Represents oil gluten and starch.
4. *D. G.*—Represents oxide of iron.
2. *P.*—Represents starch and dextrine.

No. 7.

CORN SOWN FOR FODDER.

In a former report, the advantage of sowing corn broadcast for fodder was mentioned. The experiment has been made in various parts of the country, and it is with pleasure that we find the following account from the Pedee Agricultural Society of South Carolina. If, indeed, 10 tons of well-cured fodder can be obtained from an acre in a climate unpropitious for the grasses, the South may hail this experiment as the harbinger of much good.

"The piece of land sown is a narrow slip lying on the Pedee, cleared in 1841, planted in corn the same year, and lay out in 1842. The soil is alluvial, and of a chocolate color. Early in December, 1842, it was shrubbed, and deeply broken up with a narrow scooter. On the 27th of April following, it received a cross-ploughing with a turn plough; and on the 1st of May the corn was sown at the rate of three bushels per acre, ploughed in lightly, and brushed. It grew off finely, receiving no other attention than once or twice to cut down the weeds and bushes that sprang up on its margin; and, what to me was remarkable, it retained its dark-green color during a drought of such length and severity as to cause vegetation elsewhere to exhibit evident signs of suffering. On the 20th July, when the corn was generally in silk, it was cut down with weeding hoes, no other implement answering so well, in consequence of its prostration by a gale of wind a short time previously. The average size of the stalks was about half an inch in diameter, and the height, when erect, from seven to eight feet. Three parcels, of five feet square each, taken from different parts of the piece, weighed, severally, as follows: 88, 90, and 92 pounds. Taking the average weight, we have, per acre, (assuming 4,840 square yards to be an acre,) of green forage, 156,816 pounds. After three days' exposure, the aggregate weight of the three parcels was 150 pounds; which gives, per acre, of partially cured forage, 87,120 pounds. They were then thrown loosely into an open barn, where they remained until the 15th of August; and being then thoroughly cured, weighed together 47 pounds. Taking $15\frac{2}{3}$ as the average weight of one parcel, we have, per acre, of thoroughly cured forage, 27,297 pounds. The loss in weight, as above, is greater, perhaps, than it would otherwise have been, in consequence of the corn having been harvested too early—a course I was constrained to pursue, or lose, for a time, the benefit of a large pasture field. The method adopted in curing it was to spread it on racks erected for the purpose, made of poles resting on forks planted in the ground, and to expose new surfaces to the sun as often as it was deemed necessary. A portion of it was thrown under a shelter, on rails so disposed as to admit the free circulation of air. This, being protected from the weather, cured well. With the remainder I did not have equal success, owing to the quantity on hand and the unfavorableness of the season. It was used as a winter food for cattle; they ate it freely, and kept in good condition.

"Of the comparative value of this forage, I am not prepared to speak with accuracy, having instituted no well-conducted experiment to test it; of this, however, I feel confident: that, in no other way with which I am acquainted can good and substantial food for stock be more easily and cheaply procured. The difficulty of saving it is measurably obviated by

cutting no more than can be conveniently managed; and after exposing it for a few days, although it will not be entirely dry, (particularly the juices of the large stalks,) yet it will be sufficiently so as to be safely housed in small quantities; or what, perhaps, would be a better plan for using it, at the same time that it would entirely remove the difficulty above mentioned, would be, to feed it away in its wilted or partially cured state, where a suitable piece of ground for growing it can be procured convenient to the stable or horse lot. It would not only afford a grateful food for the horse, but would also give no small relief to his owner, by coming in at a season when it too often happens there is no great abundance of provender in the barns of the cotton planter.

"Respectfully submitted.

"JNO. W. LEAK."

No. 8—(1.)

IMPROVEMENT OF THE QUALITY OF POTATOES.

Any improvement that can be effected in the quality of potatoes is important. Some observations on the subject, at this season of the year, may possibly, therefore, have a useful tendency.

It is well known that, in some soils, and most seasons, the produce of potatoes is abundant, and their quality excellent; while in others, the quantity is not deficient, but the quality is inferior; and there are situations so unfavorable, that the crop is always bad in every respect. Occasionally, indeed, cold wet seasons deteriorate this important crop, even in the best soil, on which the most skilful cultivation has been bestowed.

Supposing, however, that all has been done that could possibly be effected in the way of good cultivation, yet, when the crop is fit for taking up, its proper after-management is a most important consideration. People think that, if they guard their crop from frost, they have done all that can be needed; but this is a mistake of the worst kind. By improper management after up, potatoes of the finest quality are easily spoiled; and, on the contrary, by judicious treatment, even such as are watery may be much improved.

It is of the first consequence that *light*, as well as frost, should be guarded against; for light renders the tubers unwholesome. The stems, and, in fact, all the parts of the potato plant above ground, are more or less poisonous. Tubers are occasionally formed along the stem; but they are, as we all know, green and bad. This is entirely owing to their exposure to light. Having pointed out one of the sources of deterioration, it may be as well to name a means of improvement. Always dry the tubers before cooking them. If a potato is weighed when fresh taken up, then laid in a dry, warm place for some time, and again weighed, it will be found to have become lighter, in consequence of the evaporation of a portion of its water; and it will then, in cooking, be more floury. In Ireland, with this in view, potatoes, when watery, are often taken out of the caves, and kept in a dry place for a few weeks, and a great improvement is the consequence. The French are aware of this fact. A writer in the *Revue Horticole* says:

"In unfavorable seasons, potatoes are often found to be watery and without flavor, although cooked with the greatest care. In this case, the mode of effecting an amelioration is easy: it consists in placing them near a stove or oven for about a week previously to their being used. At the end of that time, they will be found mealy and of good flavor."

The editor of the Farmers' Monthly Visiter has this season raised between twelve and thirteen hundred bushels of potatoes on about six acres of sward land. The ground was prepared in the following manner: After the corn planting had been finished, about the 25th of May, manure (on about one acre compost, and upon the other five acres clear manure from a stable, made during the preceding summer and winter) was laid out in piles, and spread over the grass, which had then already started green from the ground, in furrows of about 12 inches in width; the whole flat was completely turned over, these shutting into each other so close as to leave no vacuum between. With the sod thus inverted, and the manure all covered to the depth of about six inches, the potatoes were planted between every third furrow, at the distance in the rows of about three feet from each other. A hole or crevice was made, from two to three inches below the surface, with a sharpened stick, and, at the distance of 18 inches, a single potato, of the common size, placed in it, and covered up—with a kick of the heel, generally, when the soil would admit of it. Great care was taken that the seed potato should not enter so deep as to go below the upturned sward. In this way the potatoes grew above the soil, while the roots drew sufficient sustenance from the decomposed manure and decayed turf at the bottom. During the whole season, there was no difficulty from weeds; the witch grass in some parts of the field, where it had taken root, did indeed, late in the summer, spring through the inverted turf. The whole process of hoeing the six acres twice cost only 22 days' work of one man. The planting was done with great expedition. In twice hoeing and going over with the cultivator, and the subsequent digging of the potatoes, neither the bottom turf, nor the manure overlaid by it, has as yet been disturbed. The crop of Indian corn intended for the same land next year (according to our present year's experience of a field last year cultivated in the same way) will derive a greater advantage from the manure than the potato crop of the present year.

One advantage of raising potatoes in this manner we believe to have been, the entire freedom of the crop from the disease and rot which have been so generally complained of. The ground was the ordinary intervale of Merrimack river, which had lain so long to grass as to give not much over half a ton of hay to the acre. It was good land, but was much in want of stimulating manure. The crop of potatoes was probably not quite so large as it might have been if the same manure had been mixed in the same depth of soil actually pulverized; neither was the labor of making the crop more than half as much; but the manure is left in the ground, to do much the most effective service hereafter. On a diligent inquiry of our potato diggers, we have not been able to learn that any of the new potatoes were infected with the rot. The earliest kind were taken from the field before the warm weather of September; and those laid in the common cellar have as yet discovered none of those offensive qualities which have been so much a matter of complaint.

One hundred and fifty barrels of the first dug were sent and sold in the Boston market, averaging, after paying the price of transport, 25 cents the

bushel. Of the long reds, we have between five and six hundred bushels in the ground, under a hemlock cover, which, in the market next spring, may be worth 50 cents the bushel. At half that price, after paying all expenses of cultivation and manure, this crop will give us a clear gain of about $20 to the acre.

On about one acre of the potato ground, manured with the stable dung, after the first hoeing, was placed some eight hundred pounds of ground plaster. Where this was applied, the tops of the potato were more luxuriant; the potatoes seemed to be fewer in number, but all of a larger size. The effect of the plaster was to make the crop at least one-fourth better.

No. 8—(2.)

CHOICE OF POTATOES FOR SEED.

"Unripened, and consequently watery, potatoes make the best seed roots, inasmuch as they always produce strong, healthy, vigorous plants; this watery matter being the germinating principle. Potatoes which have been planted late in the season, or which have grown in boggy land, or in a mountain situation, are to be preferred; as, under such circumstances, the tubers are not matured, and the farina has not been developed. On the other hand, if we use for seed roots those potatoes which have been raised on good land, have fully ripened there, and have attained all the perfection of which they are capable as to quality, abounding in farinaceous matter, but deficient in mucilaginous matter, curled, and unhealthy, a general want of vigor will be evident, and the produce will be very inferior to that from unripe tubers, as they only possess the procreative power in perfection. As an illustration, it is known to most persons engaged in rural affairs, that, in the long varieties of potato, one end (called the crown or rose end) will, when cut off, make better seed than any other part of the same potato: better, because the plant which springs from it is much more healthy, succulent, and vigorous, than the others. How is this accounted for? Simply because such rose end is the watery end. To prove this to be the case, boil such a potato, and the part referred to will be found soft and uneatable, while the remaining part of the potato is firm, dry, and floury. The circumstance of inferior potatoes begetting good ones is not peculiar to this vegetable alone, but it is in unison with all the operations of nature, and to a part of her great law which decrees that, when perfection in vegetable or animal productions has been attained, their reproductions degenerate, and *vice versa.*"—(Essay on the field culture of the potato, by Peter Cowan; second edition, 1834.)

"We think the experience of last year and this, in regard to the potato crop, is strikingly corroborative of the theory of weakness in the potato as being the primary cause of the failure; for observe the results. The under-ripened seed, raised in the bad season of 1841, produced a crop without failure in 1842, and in the alleged unfavorable circumstances of heat and drought; while the over-ripened seed, raised in the fine season of 1842, has caused extensive failures in 1843, in the alleged favorable circumstances of moisture and coolness. What should be the practice indicated by these results, but that unripened seed should be planted in all cases;

and, to prevent its becoming over-ripened in any season, let the potatoes intended for seed be raised before ripe."—*Quarterly Journal of Agriculture, July*, 1843.

The character of the season, it is true, has an important influence upon the character of the potato crop; but we think, as a general fact, much of the inferiority of potatoes, common in our market, is attributable to neglect in the selection and management of seed. It is more common than otherwise for potatoes to be stored promiscuously at harvest, and thus permitted to lie together till towards spring, when a sorting *of the best that remain* is made for seed. The selection should be made previous to storing, and a separate place provided for those intended for seed, free from light, from heat, and from danger of freezing. It is contended by many skilful farmers in England, that the *latest formed* tubers are far the best for seed, or, indeed, those which have not attained perfect maturity. The reason given for this superiority is, that those tubers which are latest formed will retain their reproductive properties more fully at the next season for planting. This theory seems plausible to us. We said *theory;* we are reminded, however, that it is not *mere* theory, for we recollect reading, not long since, several statements of practical farmers in the London Agricultural Gazette, giving the results of a practical test of this *theory* in their own husbandry; and those results were strongly in its support.

In England, among the best farmers, it is a custom to store the seed potatoes by themselves, in pits dug in the earth; and managed in this way, and being chosen from the last-formed tubers, they retain their full vigor till planting time returns; and even if not perfectly ripe when pitted, they will become so in the pits.

It is confidently asserted, by many observing agriculturists, that weakness of the seed is the chief cause of the defects or failures in the potato crop, and that *weakness* comes from over-ripeness. "I think," says a writer in the Gardener's Chronicle, "that the loss and disappointment from failure in the potato crop may, in ninety-nine cases out of every hundred, be prevented by the exercise of a little care. I knew a market gardener, famed for his potatoes, whose practice always was to dig up and put away sufficient for next year's seed, *before they had completed their growth.* They were thus full of sap, and kept so. I have myself had potatoes so waxy as to be unfit for the table; but from this very fact they made very good seed. A friend of mine called on me one day to look at his potato field, which had been well prepared and dressed with farm-yard manure. He observed that they came up very bad, and desired to know what was the matter. The fact was, that the seed had been stored away with a large mass all winter, and deprived of sprouts two or three inches long before planting. The vitality was quite exhausted before they were put into the ground; this was the secret of the failure. Soils, manures, and seasons, no doubt, will affect a potato crop in various ways; but, with a little care with the seed, any considerable failure may usually be prevented. Seed potatoes should not be of a mealy quality, nor should they be stored where they will heat, nor be kept out of the ground more than twenty-four hours after being cut out for planting."

No. 9—(1.)

[The following, from notes reported for the Cultivator, refers to a discussion in the early part of 1844, during the sitting of the Legislature of New York:]

POTATO CROPS.

Dr. Lee, of the Assembly, remarked, as a fact connected with this subject, that severe losses were experienced in portions of Europe for several years; that the matter was exciting discussions among the agriculturists of Britain and Germany, and that some of the European writers indulged in suppositions that the defect was occasioned by the degeneracy of some of the varieties of potatoes commonly cultivated. He hoped to hear from those who had been engaged in cultivating potatoes last year, particularly, such facts as would exhibit the nature of the difficulty, that some remedy might be devised against the recurrence of such losses as the potato crop in this State had last year suffered. He saw around him many who devoted large sections of their lands to potatoes for the New York and Albany markets, and he hoped they would freely communicate their experience on the subject, together with suggestions for remedying the evil complained of. The subject was evidently worthy of attention. The potato crop, for its value to man and beast, is of primary importance—more than thirty millions of bushels being annually raised in this State, which, at an average of 25 cents per bushel, made a pecuniary valuation of more than seven millions of dollars—almost equal to the valuation of our corn crop. As there is no article in greater use for food, so there is none which better repays careful cultivation.

Mr. Abbot, of the Assembly, from Onondaga, remarked, that a primary consideration with him was the quality of the seed. Some of his neighbors, like many farmers elsewhere, thought rather more of "small potatoes" for seed than he did. As well might you expect good wheat from shrivelled seed, as to look for satisfactory returns from the diminutive potatoes which many people thought "good enough for planting." His practice was to select the best potatoes for seed; and his aim was to cultivate them so as to realize large and certain crops, of quality equalling, if not surpassing, the best he planted. As for this "disease" or "rottenness" in potatoes—and certainly it proved a formidable difficulty to many farmers last year—he would merely mention the result of his own experience and observation. He had raised considerable crops of potatoes for many years, and declared that the yield was never better in quality, and seldom greater in quantity, than on his farm during last season. He had planted the seed sufficiently early to allow the crop to ripen early in the fall; and out of the quantities thus timely planted, and properly cultivated, and housed in good season, he had not lost a bushel by decay or rotting. Some of his neighbors, however, had lost considerable; and what he had observed respecting their practice and his own satisfied him, that with the potato crop planted early, so as to be fully ripened and properly gathered before the frost sets in, there is little to fear from disease or failure. What other conclusion could he draw, when he found that his success was good, as was that of neighbors around him, who concurred with him in practice; while other farmers, who were less prompt in planting and gathering their potatoes, lost much of their crop by rotting—the land being of similar quality in all the cases mentioned. In

reply to an inquiry, Mr. A. stated that his mode of cultivation yielded him 300 bushels per acre. He added, as a fact of interest on this subject, that one field of potatoes (better land than the other fields) lost him nearly all the crop, owing to its having been planted later than the other parts of his potato crop last year.

Dr. Beekman, of Columbia county, mentioned the facts within his knowledge resulting from the experience of some of his neighbors, as well as from the culture of his own farm. He repudiated the idea of any "disease" in potatoes, other than results from negligence or ignorance in the cultivators. Whatever the theories of European writers may be concerning the difficulties with the potato crop for some years past, he disbelieved that the losses of last year in this country were occasioned by any exhaustion of the vital qualities of the seed. For this incredulity he had sufficient excuse in the results of his own experience. He planted last year, as generally every year, several varieties of the potato; and the oldest varieties, so far from being exhausted through the length of the time that the kind had been cultivated, were the best among his whole crop. He would not be understood, however, as undervaluing an occasional resort to planting the seeds of the potato apple, as a means of obtaining new varieties, or of sustaining (if not improving) the qualities of the old kinds. But this he would assert, as the result of experience on his own land, and of observation elsewhere—that the disasters to the potato crop in this region resulted from the negligence of farmers; for he had yet to learn that any potato crop planted in proper soil and season, and harvested and secured in due time, had suffered among the disasters of last year; while he had unfortunately abundant evidence that the late-planted potatoes, especially in moist soils, resulted to a great degree in rottenness, occasioned by unfavorable weather in the fall. In no branch of farming is it more essential that what is done should be well done in season. Let those who lost their crop last year remember this in future, and he ventured the prediction that there would hereafter be little or no complaint of potatoes rotting when the farmer most needs them for nutriment in his family or in his barn yard. Dr. B. added, that those who turned attention to this matter, who cultivated the best kinds of potatoes in the best way, now always find ready market for their crops—especially in the valley of the Hudson, or on other channels leading to New York and other large cities. Such potatoes, he knew well, would always command a good price—from 20 to 50 per cent. more than the potatoes carelessly cultivated.

Great carelessness is manifested by farmers in reference to their potato crop. The planting is often, too often, deferred till too late a period; and many people seemingly overlook the fact that potatoes, to be of good quality, require to be fully ripened. If not matured, like other products of the earth, before the frost comes on, how can we expect successful results? Why should we be astonished at decay and rottenness among the immature potatoes, checked in their growth by the severity of early winter?

Judge Cheever said that his experience in the potato crop, during the last year, had been very much like that of the president of the society, Dr. Beekman. He had planted upon a sandy loam three varieties of potatoes—the Carter, the flesh-color, and the pink-eye; but he had seen nothing of disease amongst them. He had never had finer potatoes for the table; but others about him, who had planted upon clay soils, and especially upon level lands, where the water from the heavy fall rains of the last season did not

readily pass off, had suffered from the decay of their potatoes. He did not apprehend any evil consequences from any thing like a general or seated disease in our potatoes—nothing but what a favorable season and proper cultivation would remove. He had had experience in growing potatoes upon the bottom lands of the Hudson, upon sandy loams, and upon sand and clay mixed. He had had the best success upon the last description of soil, both in quantity and quality of the crop. He had, from his experience and observation, come to the conclusion that land that would produce good wheat would also produce good potatoes. He preferred planting early, and, if in a clay loam, upon an undulating surface; for in this kind of soil, if the ground is level, unless thoroughly under-drained, the crop is very likely to suffer from the early fall rains while it is coming to maturity. This risk is not encountered in sandy loams; there you are pretty sure of an article of good quality, but generally much less in quantity. There is great advantage in making the ground rich, and he preferred planting nigh the top of the ground, rather than burying in deep furrows; but dryer and lighter soils will admit of deeper planting than wetter and heavier. No crop suffers more from an excess of water than the potato. Water from heavy rains, standing in the field for any considerable time, is sure to work an injury, unless the roots of the plant are kept above its reach. By early planting, he meant from the 1st to the 15th of May in this latitude. The crop suffers from drought, if it occurs about the time the potato begins to form. This is as likely to overtake the early planted as the later; but, if this is escaped, the early planted is surest for a great yield and good quality. You are not likely to get a fully ripe potato from the top that has been killed by the fall frost. The potatoes planted should be of good size, and not cut into small pieces. The seed put in the hill forms the capital for the plant to commence business upon. You might as well expect a vigorous blade of wheat or corn from a small and withered grain, as a strong plant from a small potato. This crop should not be put two successive years upon the same ground. In sandy loam, he had known the crop to fall off half the second year, with the same treatment, and as good a season, except that the first crop was upon a newly turned sod.

Mr. Ransom Cook, of Saratoga, agent for the newly projected State prison, remarked that he had not recently been engaged in agricultural pursuits, and his information on this subject had been principally obtained in answer to inquiries. In the immediate neighborhood of his residence, (Saratoga Springs,) very little, if any loss, had been suffered by this disease. The soil was dry and sandy. One intelligent farmer informed him that on his own farm, where the soil was porous, he lost none of a crop yielding about 2,000 bushels; while of a field he purchased on a neighboring farm, before digging, where the soil was clayey, and retained much water, he lost the greater part of the crop. Another informed him, that where he planted the same kind of potatoes in two fields of different soils, with but one day's difference as to time, those upon a dry soil were uninjured, while he lost about one-half of those grown upon a wet soil. Mr. C. remarked that, although planted at the same time, those upon the wet soil would be later in coming to maturity; and it was believed by the owner that they were injured by a very warm fall of rain before entirely ripe.

Mr. C. said, in conclusion, that, from what information he had been able to obtain on this subject, it was the opinion of farmers in this country that the injury of the potato crop the past season was produced by a warm rain,

followed by warm weather, and upon potatoes not fully ripe, or those in soils containing much water.

Mr. Young, of the Assembly, from Queens county, in relation to the question of the president of the State society, "whether potatoes, sound and healthy when dug, had subsequently become diseased," remarked, that some potatoes planted in his vicinity the last season, when dug were apparently sound; and that before his leaving home, in December last, he ascertained, in sorting one cask containing eight bushels, that six bushels of them were completely rotten. In relation to the question which has been raised, as to the soil best adapted to the potato, and the quality of the seed, he remarked, that the soil of the section of country he represented (Long Island) is materially different from that of any other portion of the State, being principally a light sand, which is not admitted by all to be the best adapted to the growth of the potato. The potatoes of Long Island are generally of a mealy character, and superior quality. One striking evidence of that fact is, that they will frequently sell in the New York market for 50 cents per bushel, when the Connecticut potato, grown upon more loamy soil, is selling for only 31¼ cents.

In speaking of the disease among potatoes, he would say that he was not aware of any particular disease, although the potatoes of Queens county, the past season, were of inferior quality, and during the fall months large quantities of them rotted, which was generally attributed to the unfavorable season. It will be recollected that we had no rain during the whole month of June, and the potatoes, which were not materially affected by the drought, were sound, and our only good potato. We find it altogether preferable to plant our potatoes very early or very late. Those planted as soon as the frost will permit are decidedly the best; and it will be recollected that the young and vigorous plant is not easily killed by the frost, as one that is mature and ripe. The early planted potato gets its principal growth before the heat of midsummer, which usually brings with it dry weather—a sure check to all vegetation. The potato plant in mid season (or late in the month of May) is usually checked by the scorching sun or drought of midsummer, (July and August,) from which it never recovers; and the consequence is, small size, light produce, and inferior quality. Those planted late in the season form and mature as the weather becomes more cool; and the growth being more rapid, the potato is larger, and the produce greater than the early planted potato; but the flavor and richness are not as good, a too rapid growth not being congenial to the potato.

In relation to the mode of cultivation, (said Mr. Young,) we take a field where corn was grown the preceding year, and now prepared for oats or barley, in which a portion is reserved for potatoes, which is ploughed in drills about three feet apart; in which drills is placed a liberal quantity of stable or barn-yard manure, as is always required in cultivating our land. The potatoes are then dropped about ten inches apart; we then plough a furrow on each side of the drill, covering up the manure; the furrow is left in this rough state until the sprout is about appearing at the surface; withes of hickory are then wound among the teeth of a harrow, with which the field is harrowed lengthwise of the drills, which partially levels the surface, and kills the weeds; after the vine is well above the ground, we plough and hoe; before the vine is in full blossom, we again plough, and with the hoe hill up the rows. Nothing further is done until harvesting, which is accomplished by ploughing each drill lengthwise, which leaves the principal portion of the potatoes on the surface, to be gathered by the boys; after which,

we harrow the field, and pick up the balance of the crop; which we are careful to protect from the rains or wet, and have housed the same day as gathered

In relation to the seed, we find the potato degenerates, like all other vegetation, with the exception of weeds. After cultivating one variety a few years, it is found that the vines lose their vigor—the potatoes of less size, the produce much smaller. A few years since, the most choice variety was a yellowish potato, called the "English white;" then the celebrated "kidney" or Poole potato; then the "pink-eye;" and now the "Mercer" is the universal favorite.

Professor Emmons, of the geological survey, remarked, that the disease of the potato, as shown by the microscope, is located in the cellular tissue. The starch granules do not appear to be affected at first, nor until the disease has existed for some time. The disease itself is a true gangrene—commencing in the cellular tissue, at numerous points, till finally the whole becomes involved in it. The skin preserves its soundness for a long time after the rest of the potato is destroyed. Three causes may be assigned for this decay: 1. Rapid growth, promoted by high temperature and much rain just at the period of ripening. 2. Constitutional decay of the seed, from age. 3. The nature of the soil, together with late planting. Much evidence was adduced (said Professor Emmons) to show that potatoes, upon a clay soil, especially if planted late, were or have been particularly subject to the disease; while those which were planted on a sandy soil, and were ripe when gathered, have not been wholly free from disease. But the experience of the speakers generally on this occasion enforces the position that early planting in a dry, sandy loam, presents the greatest security from future attacks of the disease.

The facts and arguments at this meeting, it may be seen by this abstract of discussion, did not justify a supposition that the theory of European writers, respecting the alleged degeneracy of certain kinds of potatoes, is any wise applicable here, so far as the losses of last year are concerned. So far as the loss being occasioned here by the "degeneracy" of certain varieties of potatoes, it is in proof that many of the best crops were realized from the oldest varieties. The most hardy kinds, it seems, have been least affected; and the least hardy—such as the Mercer, or Chenango, Foxite, &c.—have suffered most. It was nearly the unanimous opinion of those who spoke on the subject, that the prevalence of the defect or "disease" of last year was caused by the very warm and wet weather following a severe and long-continued drought. The proofs on this subject, furnished by several speakers, were—that potatoes which were planted on dry soil, and so early that they reached maturity before the peculiar weather alluded to, were scarcely affected at all; whereas the same varieties, planted later, and being in an immature state when the change took place, were seriously affected when harvested, or rotted during the winter. The prevalent opinion of the meeting was, that the best mode, under any circumstances, consisted in planting the best kind of seed at the earliest period when the ground is in suitable condition; the yield generally proving better, while the crop is less liable to blight or defect of any kind.

"*The potato rot.*—A writer in the Bangor Whig attributes the prevalent disease among potatoes to the old age of the varieties which are most affected by it. He says: 'I have been forcibly struck with this truth, that where the potato has been attacked with the rot, it has been confined, with few exceptions, to those varieties which have been propagated the longest;

while those which have been recently introduced from the natural seed are as fair as a milkmaid's cheek. The fact is, that most varieties are actually dying with old age; and, like the hard winter which hastens the old man to his tomb, so the past season has been rife with all the elements necessary to quicken these principles of decay, as we have been visited with almost every extreme to which our fickle climate is subject.'

"So far as the observation of the writer has extended, the Chenango variety, which has been cultivated by farmers for a long series of years, has been most affected by the disease. The English whites and long reds have not suffered so much, because they have less constitutional defects; but these 'have for some years shown strong symptoms of decay.'

"An intelligent farmer of our acquaintance corroborates the opinion advanced in the above paragraphs, attributing the disease to the constant replanting of the same seed. He says that the distemper has become so fatal in its consequences in some of the Eastern States, that the farmers call it the potato cholera. The farmers of Nova Scotia, who shipped large quantities of this root to Boston during the past season, have long been acquainted with the disease, and call it the rot. It seems to pervade particular farms; and sometimes appears in the stalk, like rust, long before the potato has arrived at maturity; and, on cutting open the young root, the disease will be found to exhibit itself in black spots throughout the inside of it. At other times, the disease will appear after the potatoes have been harvested, and buried or put into the cellar. The first indication of the disease which the farmer receives will be from an offensive smell, arising from their decomposition. His only recourse then is to remove them as soon as possible, as the distemper, in a few days, infects the whole body, no matter how large it may be. The progress of this distemper among the potatoes in Nova Scotia seems to have been somewhat singular.

"It would break out suddenly, and spread from farm to farm, and cellar to cellar, lingering a few years, and then entirely disappearing for a time. The farmers, supposing the epidemic was located somewhere about the premises, resorted to whitewashing and cleansing their cellars, but to no effect. At length the evil was discovered to be as stated above—in the continual replanting of the same seed. Like all other plants, the potato finally degenerates and runs out. The Nova Scotians now plant the balls, and thus procure new seed, which, during the second year, arrives at maturity and full size. Seed thus procured is proof against the rot; and by this practice they were enabled to furnish seed potatoes to some of our New England farmers for last spring's planting.

"The distemper with this indispensable plant seems not to be confined to this side of the Atlantic, but has long been known to the people of Ireland, whose potato-eating propensities are so proverbial. From a gentleman from that country, we learn that in 1816 the apple potato (which, for several years previous, was the favorite and most excellent of the many species then in existence in that country) exhibited symptoms of decay not unlike those already spoken of, and ceased to be a reliable portion not only of the sea stock of the emigrant, but was seldom purchased for the more immediate use of the table. The result was, that the farmers discontinued its cultivation, unwilling to lose their time and tillage on seed which could no longer sustain the reputation of the stock; and this is still the custom there. It would hence appear that, either unable or indisposed to inquire into the cause and nature of the decay, they came at once to the root of the evil, by

rejecting the diseased esculent altogether. On the subject of potatoes, Irish authority is not so very bad."—*New York Tribune.*

"*Potatoes.*—From all directions we hear complaints of rot, or premature decay, in the potato crop. This crop is so important in the Northern and Eastern States, that we need no apology for being somewhat particular in our notices of it. The Cleveland (Ohio) Herald says: 'The potato crop in this section, which a few weeks since promised to be a very large one, we learn from our agricultural friends, is much injured by diseased potatoes. In many fields, a considerable share of the potatoes are diseased and rotten; and in some, so much as to be entirely worthless. Digging does not appear to arrest the progress of the disease in potatoes, as some have lost their crop after taking it from the hill. We are informed that, in some instances, diseased potatoes have proved fatal to swine fed with them.'"

From the Rochester Democrat.

"We hear that, in many sections of the country, the potato crop has been considerably injured by the rot. This is probably owing to some new disease, instead of the drought—the same calamity having last year happened to that crop at the East, when the season was directly the reverse of what it is now. It is dangerous using potatoes thus affected? We have heard of recent instances of the death of animals, to which potatoes partially decayed had been fed."

From the New Haven Herald.

"We have been told that, in one town in this county, the effluvium exhaled from an undug potato field was as offensive as white fish; and that this is the case at Horse Neck, &c. That at Colchester, men could scarcely be hired at $2 per day to remove these putrefying articles from the cellars; and, in some places, farmers had ploughed them in deep, to get rid of them.

"In our own vicinity, many potatoes (more particularly those dug within a week) are afflicted with this malady. A friend has a crop raised from a hamper of Irish potatoes, which had no rot affection among them; but a row of Mercers, contiguous, were every one of them wholly rotten. It is said some persons have been afflicted with indisposition from eating potatoes this season; and that one person lost two hogs, which had died in consequence of having eaten of them. This being the case, the peculiar nature of the offensive virus generated must be different from that which takes place in decaying old potatoes, kept late in the spring or summer, of which my hogs and cows have always eaten with impunity. The extraordinary offensiveness of potatoes affected in this manner was brought strongly to to our perception yesterday. A bushel of a choice kind, of small size, had been dug from a dry piece of ground in the upper part of the city. They had been placed in a shed room over night, where they were noticed by the cook, (an Irish woman,) who had heard nothing said, and had noticed no decaying ones among them. She observed that those potatoes had better be removed, as they rendered the place very offensive. The basket was emptied under the shade of a tree, and examined, and four or five small ones only were found decayed—some on one side, or at one end; from each of which an offensive effluvium of great intensity emanated; and one person, used to farming, &c., did not get over the effect of their influence for several minutes. We are strongly of opinion that potatoes had better be left in the

ground, to be dug when wanted, or till cooler weather; and purchasers had better buy but few at a time to put into the cellar. "MEDICUS."

The same disease prevails extensively among the potatoes in Massachusetts, and the southern part (at least) of New Hampshire. From Maine, which is the most important potato-growing State in the Union in proportion to its population, we have heard no complaint. On the contrary, the Bangor Whig says: "The potato crop in Maine will be better this year than for some years past."

"*Disease among potatoes.*—We have several times alluded to disease among potatoes. The same disease is noticed in the Amherst Express, Pittsfield Sun, and Bridgeport (Conn.) Farmer. It appears to be very extensive; and this crop, in many towns, is nearly destroyed. We have a field of 'Mercers' that have nearly all rotted; while 'Carters,' adjoining, appear much less injured. A writer in the last Pittsfield Sun remarks: 'As yet, I believe no one has accounted for this disease. On examining my own field, I find that each remaining green leaf is covered with small insects, about the size of the house flea, very black, which fly off when disturbed. The tender parts of the leaves appear to have been eaten, which may account for the premature decay of the tops.'"—*Northampton* (*Mass.*) *Democrat.*

"*Rot among the potatoes.*—We understand from a gentleman residing in Westchester, (says the Courier,) that the old trouble among the potatoes has returned in that county. On some farms the crops have so rotted in the ground that scarcely any portion of them will be worth digging; and, in nearly all the fields, the injury has taken place to a more or less extent."

Cause of the potato failure.—For some time after the failures appeared, I durst not venture to offer my opinion on the subject; but, from seeing the fanciful opinions that began to be ventured as to the cause of failure, I turned my attention to the subject, and soon came to be satisfied that the evil arose entirely from the seed being placed in the ground when it and the manure were too dry to bring on vegetation."—*Correspondent of the Ayrshire Agriculturist.*

"*Potatoes.*—We have heard complaints in this and neighboring counties of a disease among potatoes, which causes them to rot. The following is from the Greenfield (Mass.) Democrat:

"'The failure of the potato crop seems to be universal throughout the Northern States. In this vicinity, scarcely any will be preserved.' The Barre Gazette says: 'Nearly or quite the entire crop of potatoes in this region is lost. When dug, they are found to be diseased and rotten. Some have been dug early, and placed in the cellar in an apparently sound condition, and in a few days found to be decaying fast. They appear to sight and smell as if rotten. Several of our farmers have commenced ploughing them in, in the field. We learn that the difficulty extends to all the region about us. It is said some hogs have died, after being fed with them. No reasonable cause is given for this singular occurrence. Should the crop fail throughout New England in the same manner, great suffering as well as loss must ensue.'"

The senior editor of the Boston Courier, in a letter from Trenton, Oneida county, New York, mentions that the potato crop is nearly destroyed by rust in that region. On one farm he noticed, besides its necessary number of ordinary laborers, more than one hundred swarms of bees, which had

already made for their owner, during the present season, money enough to purchase in the New York market all the luxuries, food, and wearing apparel, that a large family could require for its gratification, and give him a surplus in cash to add to his former capital.

[This last statement, respecting the bees, &c., though it does not relate to the potato disease, is yet sufficiently interesting to allow it to stand.]

"*Disease among the potatoes.*—A disease of peculiar character seems to have affected the present crop of potatoes in some parts of the country, and is producing serious effects. The Claremont (N. H.) Eagle has the following article on the subject:

"'*The potato crop.*—We regret to learn that this vegetable, which a few weeks ago gave great promise of an abundant crop, has, on almost every farm in this vicinity, been damaged, and, in many instances, wholly destroyed, by a disease hitherto unknown among our farmers. The stock bears the same appearance as when struck by rust, and the vegetable immediately decays. When first discovered, many of our farmers went to digging, but soon found the decomposition did not stop when taken from the earth; and in all cases where the damaged crop has been put into the cellar, so offensive has been the smell arising from them, that they had forthwith to be removed and buried up in the ground. It has been suggested that farmers had better not dig the crop at present, but let them remain in the earth until the damaged portion should become so far decayed as to be easily distinguishable. Time and unnecessary labor may thus be saved. We are told that the crop throughout the State has been similarly affected; also, in Vermont, Massachusetts, and other New England States. If the destruction has been general throughout the country, the loss, especially among the poorer portion of our population, will be severely felt.'

"We passed through Connecticut and western Massachusetts (Hampden, Hampshire, and Franklin counties) a few days since, and found the potatoes, almost every where, suffering from a modification of the same disease. The tops died prematurely, and before the potatoes had gained their maturity; but we did not learn that the potatoes (roots) had any where commenced rotting. Some that we saw dug in Hampshire county were sound and good. The latest planted potatoes suffered most."

"*Westfield, Mass., Nov.* 21.—The potato crop throughout this region, and very extensively, as you already know, has suffered serious injury from some cause not yet fully ascertained. I can add nothing accurate to the information already before the public; but suppose that, although the disease affects alike potatoes in a variety of soils, yet it is worse in the mountainous districts than on the plains and near the Connecticut river. Carters seem to fare better than Mercers, though they do not by any means escape. Both early and late potatoes are spoken of as doing better than those planted at the ordinary time. Potatoes which appeared good when they were dug have rotted soon after, or turned black on being boiled. Stories are told of hogs having died from eating the diseased roots. But there is difficulty in obtaining accurate information here, as the disease is less severe than in the neighboring towns. An insect about the size of a flea is the only ostensible cause of the damage; it appears, however, to confine its attacks to the leaves."

"*Disease among potatoes.*—We have noticed, throughout the country, that potatoes show signs of premature decay. The vines generally hold green until the first frost; but this year, the vines of some entire fields

have commenced drying up, while the potatoes have not yet reached their maturity. The crop will not be half a yield. We learn, from a gentleman who has passed through New York recently, that the same disease seems to be prevalent throughout that State. This is very singular, and is a subject of sufficient importance to claim the attention of scientific men, that the causes may be made known, and, if possible, the evils remedied another year."—*Pittsfield* (*Mass.*) *Eagle.*

"The same disease prevails among the potatoes in this region. We saw whole fields, two weeks ago, where the vines were all dried up; and we understand, from various quarters, that the crop is so injured, that good potatoes may be expected to be very scarce in the fall."—*Bridgeport Farmer.*

For the Journal of Commerce.

"*Banks of the Wallkill, Orange county, September* 21, 1844.—Notwithstanding the intensity of the drought, and its long continuance, the potatoes in this section of the country are rotting to such an extent as to destroy nearly the whole crop. There are two kinds of rot—the dry and the wet. The latter reduces the potato to a substance like paste, with tenacity sufficient to rope when held up, and the semi-fluid mass strings down like honey. The cause of this disease cannot be ascertained, or even guessed at. The potato is first attacked with the disease, after which the vines die and become dry, and in that state can be pulverized to a powder. Potatoes have, comparatively speaking, been but recently introduced into use; but the consumption has become very extensive, taking the place of other food. Farmers will be obliged to turn their attention to the cultivation of other vegetables, if the potato crops continue to fail for years to come as they have done for two years past. The potato contains about 72 per cent. water, and 28 per cent. meal. The meal is composed of three distinct substances, viz: fecula, fibrous matter, and mucilage. The proportions of each may be set down at 16 per cent. fecula, 8 per cent. fibrous matter, and 4 per cent. mucilage. Potatoes are often used for making starch, and sometimes for making whiskey. An analysis of some of the diseased potatoes, in different stages of the disease, may afford some useful information."

"*Disease of potatoes.*—In heavy ground, in this vicinity, quantities of potatoes are entirely rotten and spoiled. Light and sandy soil has proved, this season, more favorable to this crop. The constant wet weather is the supposed cause of the potato disorder. There has been no drought here this year."—*Jamaica* (*L. I.*) *Farmer.*

"*The potato crop.*—The Belfast Journal states that potatoes in that vicinity have been very materially injured by rust. The potato fields are black—the tops being killed, and the potatoes, for course, prevented from further growing. Many farmers will get but half a crop."

"*The potato crop.*—The Albany Argus says that the disease has extended into the towns in that county, particularly into the Helderberg region. An intelligent farmer from that section states, that in a field of 500 bushels of potatoes, 474 bushels are rotten; and his neighbor's fields are touched in the same way."

"The Providence Transcript of Friday states that three men in Cumberland are reported to have died, a day or two since, from eating diseased potatoes."

"The editor of the New Bedford Bulletin states that in different parts

New Hampshire, quite a number of cattle have lost their lives in the same way. One farmer in Jaffrey lost eight or nine hogs, which had been fed upon his potatoes; and there are many other instances of a similar character in that section."

From the Massachusetts Ploughman, September 21, 1844.

"*Rot in potatoes.*—Mr. Editor: Most of the potatoes in this vicinity, with the exception of some very early kinds, are affected with rot. It commences on the outside of the root, and extends until the whole becomes soft. They are decaying very rapidly. In some fields where it has not been discovered till within the last five or six days, but few can now be found that are not affected more or less. It is the opinion of some, that there will not be enough saved for seed. Where they have been dug, and put in cellars after the rot had commenced in some, the whole have been entirely spoiled. We are informed they are in the same condition in the neighboring towns and the adjoining parts of New Hampshire. The weather for about a fortnight previous to the first of September was very wet, and towards the last of August the vines rusted suddenly, being dead in three or four days after the rust began; yet they yield tolerably well. Now, sir, can you tell us the cause of this decay in the root? and can they be assorted so effectually as to save those not yet affected? Or must the crop be a total loss? "A SUBSCRIBER."

"SOUTH WOODSTOCK, VT., *September* 9, 1844."

"We apprehend there are not many in this country who have much experience on this subject. We hear many complaints this year, from various quarters, of the rotting of potatoes in the field; but, as we have never suffered from rot in our own fields, nor seen the disease prevailing in the fields of others, we can do no more than theorize on the cause or causes of this attack on the most useful root with which Providence has favored us.

"It has, in this country, been very generally supposed that the potato is not injurious to any soil—that their tendency is to enrich, rather than to impoverish the grounds that bear them; though our own individual opinion has long been, that potatoes are more exhausting, or at least more injurious to some kinds of soil, than Indian corn is. On some of our sandy loams we find we have better harvests of grass and of hay after corn than after potatoes, though both fields were equally manured.

"We also find that rotation is more necessary when potatoes are planted, than in corn or other crops; that, when planted for two or three years in succession on the same plot, the harvest diminishes, and the vines are much more liable to rust. This has been noted in New Hampshire, where very large quantities have been raised for distilling; also in Maine, where the soil is well adapted to the potato. We have seen English accounts of diseases in potatoes, and to such extent that whole counties have discontinued all attempts to raise them. Some have recommended procuring seed from a distance, and others a strict rotation of crops, which would admit the potato but once in a number of years. We are inclined to think a clayey soil is less injured by them, and favors their production more than sandy loams. We have raised large quantities of them on our farm on the banks of the Kennebec; and though the soil there seems to suit them, they are more liable to rust than in Massachusetts. They are very apt to rust

when you plant a field with them for two or three years in succession. The potato plant was considered poisonous in South America, whence it came, but it has much improved on transplanting. Yet now, if you expose a potato for two days to the sun, it turns green, and is not fit for use. Potatoes are thought to be light food, and easy of digestion; and this may be, when they are grown on a congenial soil, and become so ripe as to be mealy; but no cooked food is harder of digestion than an unripe or watery potato, such as most people are obliged to eat, if they eat any. You will find that an animal which happens to vomit food two or three hours after eating will always heave up large bits of potato, if it has eaten any. Sometimes the bits of potato only will come, the other food being all digested.

"We can suggest no better remedy for the rot in potatoes than planting a field with them once only in a number of years, and then on land not very wet. Wet grounds and wet summers are disagreeable to them. We once supposed the more wet from the clouds, the better would be the potato harvest; but it is not so. The present crop, in our vicinity, will be more than middling, though we have had a dry summer. Change of seed or tubers may also have a good effect, but both may not remedy the evil spoken of. We should like to hear facts or opinions from other correspondents on the subject of this complaint. We should like to know whether potatoes are not more liable to this attack when they are planted with green manure in the hill, than when it is spread over the field, and mingled with the soil.—*Editor.*"

"*The disease in potatoes.*—Have you found out the cause of the strange rot in the potato crop? is the anxious inquiry of almost every farmer we converse with. It is indeed an important question, for it affects interests of vast magnitude to the farmers of this country. The extent of the evil is much greater than was at first imagined. We see accounts of the partial destruction of the crop in many parts of nearly all the New England States, as well as this State; also in Canada, and the northern portion of Ohio. In many parts of Europe, too, the injury sustained by this crop, from the same or a similar cause, has excited much anxiety for several years past; and much discussion has been had respecting the cause and remedy, but with no better success in arriving at satisfactory results than in this country. Several correspondents, in accordance with our request, have, during the past month, sent us the results of their observations and cogitations on this subject; but, we regret to say, they are all so vague and contradictory, and embrace so few facts, that their publication would be of no benefit. In all matters of this kind, we want facts, not theories. Give us the whole particulars—facts minutely observed and plainly described; and we will do the theorizing, if any is necessary. In our exchange papers, and others that have been sent us, we find a vast amount of speculation, together with some facts and plausible philosophy on this subject; still, however, we have seen nothing that, to our mind, appears like a definite and satisfactory explanation of the cause of the malady. In order, however, to throw all the light we can on the subject, and to assist our readers in making up their minds, or in conducting further experiments and observations, we will give a summary view of the various theories extant, and the arguments that have been adduced in their support, together with some remarks of our own in relation to them.

"*Insects.*—Mr. Henry M. Paine, of Oxford, in a communication for the Massachusetts Cataract, says he examined the diseased potatoes with a mi-

croscope that magnified nine thousand times. He found no insects in the roots themselves; but in the diseased stalks, near the junction with the roots, he discovered an insect of a dark brown color, having the body shaped like the soldier ant, with the legs of the hairy garden spider. On the fore body were two projecting sockets, plainly indicating that the insect had at some period belonged to the winged tribe."

We copy from the Cataract the above representation of this insect magnified. The editor says: "Whether this insect causes the disease in the root, or the disease in the root causes the presence of the insect, is yet a mooted question."

The editor of the Westfield (Mass.) News Letter says: "The rot in the potato is not owing to an epidemic influence operating as a disease, &c., but to an insect that has made it a nidus for the perpetuation of its species." He then refers to the numerous instances of injury from insects to fruit, crops, &c.; but does not make out a very strong argument to our mind, nor evince much knowledge of entomology. "From some of the infected potatoes," he says, "may be seen the insect in its pupa state escaping; in others, you may, on boiling, find the rudiments of the insect in embryo; and in others, no insects will be found, they having escaped into the ground."

Mr. Archibald McAlister, of Salem, N. Y., in the Washington County Post, says: "About the 1st of September I opened a few hills of pink-eye potatoes having decayed tops, when hundreds of small white insects were seen on the potatoes; some of the potatoes were entirely rotten. I however resolved to give the subject a more thorough investigation. Having washed a few of them perfectly clean, I examined and readily discovered that there were, *first*, minute punctures through the skin into the substance of the potato; the healthy appearance of the skin for a short distance around the perforations was changed to a brown color; second, a vesication or blister; third, a vegetable abscess of limited extent, filled with purulent matter, evidently showing that the potatoes are very much infested by the insects, and were going to decay in consequence of the ravages of these borers; fourth, the appearance of moist gangrene, of a livid or purple color, which is only a variety of decomposition, resulting from the injury inflicted by those insects.

"The perforations in the skin appear to be made by the different kinds of worms. The most numerous are about half an inch in length, of a brown color; body oval, when full size. The other is a small brown worm, body round, and the size of a pin wire, an inch in length. On the potatoes are small white spots, resembling potato starch, which I at first mistook for mould, but proved to be the castings of these destructive borers.

"As the potatoes were past the flowering season when I commenced my observations, I had no opportunity to trace the history of these insects any further; and, consequently, their larvæ are unknown to me. A good description of the larvæ, and a more full account of their habits, seasons, changes and transformations they undergo, are still wanted; it is probably the curculio, a genus of insects belonging to the *coleoptera* or beetle order. Judging from a few experiments which I have made, by sifting air-slaked lime both on the sound and on those which have been punctured by the insect, I believe that it will destroy many of the insects, and have a salutary effect on the potato."

George R. Perkins, Esq., in the Utica Daily Gazette, says:

"For several years past, I have been making a few observations, in order, if possible, to determine the cause of this disease. I find the vines of those potatoes which are rotten to be hollow for four or five inches above the surface of the ground; they bear the appearance of having been eaten out by an insect; and, in many cases, I discovered a small green colored maggot in the cavity. On scraping off the outer bark from the vine, I discovered that the leafless buds had the appearance of having been eaten out, leaving the holes through which, I conjectured, the insect had passed. Those vines attached to a sound and ripe potato were solid, and partially green. Is it not possible, and highly probable, that all this evil may thus be caused by an insect?"

In the Massachusetts Spy, Mr. Samuel Hartwell says:

"From an examination of several varieties of potatoes, from the same and different locations, I think I trace the discease, from its first attacks to its consummation in the total destruction of the potato. It is found more commonly, though not exclusively, in connexion with the green tops, on late crops. It commences in the eye or germ of the future plant, which first dies; and from this point it spreads wider and deeper, till the whole potato decays. In connexion with all its stages, except its most advanced decay, but more especially in its incipient attacks, are found maggots, or larvæ, and other creatures, which I shall call insects; and even in the most decayed specimens there are, apparently, traces of their mischievous work. The larvæ, or worms, average about a line in length; are slender, with dark heads, semi-transparent bodies, and are sluggish in their movements.

"The insects are, in some, invisible to the naked eye; others, a mere visible white point; and others, still, nearly a line in length, with numerous short legs, long antennæ, of a white color, extremely active and shy."

Here we have a goodly array of witnesses; and more might be adduced, proving that insects are sometimes found in the diseased vegetables, both in the roots and tops; and it is possible that they are the cause of the mischief; but the evidence is only circumstantial, and is far from amounting to proof. It is well known that decaying substances often attract the larvæ of insects; and their presence in these cases is quite as likely to be the result as the cause of the decay.

Influence of the atmosphere, &c.—In the Amherst (Mass.) Express is a scientific communication, probably written by Professor Hitchcock, which contains much speculation, of but little value, together with some ideas worthy of consideration. We give two or three extracts.

"Plants, being living beings, like animals, requiring a certain state of air, moisture, light, heat, and electricity, and proper food, will of course be liable to disease, like animals, from an excess or deficiency of any of the agents that affect them.

"Thus, mildew results from an excessive perspiration from the leaves: the blight in corn and oats has sometimes been the consequence of a great amount of electricity or lightning; the dropsy, or jaundice, results from a superabundance of raw juice, from frost, or bad cultivation; and blotches and canker from a deficiency of nourishment or a sterility of soil.

"But the specific character and causes of disease in plants are comparatively but little known, yet we frequently see their effects; and my conviction is, that the failure of the potato crop this year is the result of disease. The

tops failed first, and soon appeared as if they had endured hard frosts. Now, it is in the leaves and stalks that the juices and other principles that nourish the roots and tubers are prepared; so that, if these fail, the potatoes must be stopped in their growth, and their juices and other ingredients be left in a crude and half-formed state. In other words, they do not ripen, and of course are liable to decay. Those which I have seen appear like potatoes a few days after they have been frozen; and, on cutting them open, they look like half-decayed wood.

"As to the supposed poisonous quality of potatoes affected by this malady, all unripe fruit is unhealthy, more or less; and I doubt whether this is not about all we can say concerning these potatoes—I mean, that there is not any peculiar virus in them that needs excite a panic; and although it is true that the potato does belong to a poisonous tribe of plants—the solanaceæ or nightshade tribe. And it is not impossible that when its secretions become unhealthy, they may more easily change into strong poisons than in other plants. But there is one principle on this subject, which, if regarded, may, I think, prevent all injury to man or beast. Boiling, or roasting, or baking unripe fruit, and even some very deadly poisonous vegetable substances, will render them comparatively harmless, and even highly nutritious. Thus the root called cassava, which is a deadly poison if eaten raw, is eminently nutritious when roasted. There is no danger that man will eat the potatoes under consideration without cooking, and therefore there is little danger to men if they reject those water-soaked; and I think they ought, if possible, to follow the same rule as to the lower animals, viz: to boil the potatoes given to them, and the danger will be small.

"I strongly suspect that the strange disease, which, for several years, has so deeply affected the sycamore, plane, or buttonwood tree, (*platanus occidentalis,*) is analogous to that which has now assailed the potato. I was struck with the resemblance, when cut open, between a partially decayed branch of the sycamore and a potato in the same state. I do not believe that in either case the disease results from parasitic plants or insects—two fruitful sources of disease to plants. Why may it not be some atmospheric agency, too subtle for the cognizance of our senses, like those which bring such epidemics as the influenza and the cholera over particular districts or continents? Modern science has shown us that many of the most powerful agencies of nature are concealed from common, and even acute observation. May there not be others, yet undiscovered, which deeply affect the delicate machinery of organic life?

"P. S.—Since writing the above, I have been examining my potato field, which is not large, but I find that the decay has made a good deal of progress within ten days; and also, as I fancy, the process of ripening those potatoes that are sound; so that it is now pretty easy, at a glance, to separate the sound from the decaying ones; and hence, in my opinion, it is almost time to dig them, as the tops and roots appear to have lost nearly all their vitality. After the sound ones are dug, I think they ought to be spread out in the sun for several days, till thoroughly dry, before they are laid in a pile; and then, I fancy, there will not be much danger of decay. I find them in the worst state on the wettest ground. The Carter potato is the most decayed; the common round red ones nearly as much; and the ladies' fingers scarcely at all."

Potatoes intended for food should never be laid in the sun. It may benefit those intended for planting. Wet weather has, by many persons, been

assigned as the probable cause of the rot; among these, is the writer last quoted from. He says:

"As to the cause of this disease, I feel more in doubt. It must be something, however, derived from the atmosphere. It is so widespread, I incline to the opinion that the season has been too wet for this crop; and yet, on inquiring of Professor Snell, who keeps an accurate register of the amount of rain in this place, I find the quantity for June, July, and August, to be less than for two years past. I am certain that my garden suffered exceedingly during the three past years from drought; but this year it has been rather too wet. And I think the apparent discrepancy reconciled, by finding that this year the rains and showers have been more equally spread through the season than in the two previous years; and hence we learn that the amount of rain in a season is a very poor index by which to judge of the state of the soil as to moisture and dryness. I am confident that in this region the ground has been too wet for some crops—the potato among the rest; and I find that on dry land it is less affected than upon wet soil. If this be the cause of the disease, I shall expect to find that those parts of the country which have been dry will not have suffered much in this way."

In direct opposition to this opinion, many writers have attributed this disease to the drought. And it is well known that the past season has been uncommonly dry in most parts of the country.

Deterioration of varieties, &c.—The editor of the Buffalo Commercial Advertiser says: "The disease has been on the increase for several years, and has excited great interest in Scotland, Germany, Sweden, and Russia. The better opinion in those countries is, that by long propagation from the tuber, without recurring to the natural seed of the plant, it has lost a portion of its vital power, and hence is extremely prone to blight, rust, and to rot. We have paid considerable attention to this matter for the last eighteen months, and have found that many plants, last season and this, have perfected no blossoms or seed. Whenever balls are produced, they should be carefully dried, and planted next spring, with only a few seeds in a hill, and cultivated in the usual way. Potatoes thus grown, in Germany, have been imported into Edinburgh, and proved to be both sound and excellent roots by several years' experience. The same trials have been made in Massachusetts, and on the Hudson river, with like success. The potato crop is the most valuable of any grown in this State. The loss last season from rotting exceeded $700,000, and we fear that this year it will fall but little below $1,000,000."

In relation to the foregoing, we should state that the circumstance of the plants producing no blossoms or balls is no evidence of a lack of vital power. It is a peculiarity of several varieties, that they never produce flowers or fruit. An excellent new variety in England, twenty years ago, was named "no-blowers" from this circumstance. Another objection to this theory is the fact, that Mercers, and several other comparatively new varieties, have suffered worse than the flesh-colored and English whites, which are the oldest kinds known in this country. It does appear, however, that entirely new varieties, and seed obtained from other countries, are least liable to be affected.

The New Haven Herald says: "A friend has a crop raised from a hamper of (imported) Irish potatoes, which are free from the rot, while a row of Mercers contiguous are every one affected."

The editor of the Albany Cultivator, speaking of the crop of Professor Hall, near that city, says: "Among several kinds planted on the same description of soil, we found that the Mercers had suffered most. The early June and some other kinds planted at the same time, in adjoining rows, were but little affected. The flesh-colored, round blue, and long red varieties, have not been much injured, unless on wet heavy soils." In the same paper, Mr. M. Y. Tilden, of New Lebanon, says: "We also found that the flesh-colored were less affected than the Mercers, Carters, or pink-eyes."

A Massachusetts paper says: "The disease affects alike potatoes in a variety of soils, yet it is worse in the mountainous districts than on the plains; and near the Connecticut river, Carters seem to fare better than Mercers, though they do not by any means escape. Both early and late potatoes are spoken of as doing better than those planted at the ordinary time."

Manuring in the hill.—Some writers attribute the disease in potatoes to the contact of manure with the roots in the ground. Among these, is the author of a treatise on the subject, published at Glasgow, Scotland. He recommends manuring only for the previous crop, or else using rotted manure, and incorporating it thoroughly with the soil before the potatoes are planted. Several instances have been related in this country, where the potatoes manured in the hill, or row, were much more injured than those manured otherwise. A farmer in Vermont states that his potatoes, where the land was manured with barn-yard manure, are almost entirely cut off by the rot; while those in a piece manured with muck soil are perfectly sound and healthy.

Among the foreign items in the last number of the American Agriculturist, it is stated: "This disease seems to be as destructive in Great Britain, Ireland, France, Germany, Holland, and Russia, as in our own country, and is attributed to many causes. The remedies suggested are—to keep such as are intended for seed deeply buried in the ground all winter, thoroughly draining and subsoiling the land where planted; to pit them in small quantities; to select seed for planting not quite ripe, and such as have not the slightest appearance of being watery; liming the land; obtaining new seed, either from planting potato balls, or from some distant country where they grow in a healthy state; after digging, spread the potatoes in the sun till they become dry and unfit for food, then stow them away till required for planting; topdressing the plant with nitrate of soda and sulphate of soda and magnesia; selecting such tubers for seed as grow near the top of the ground, and are quite green; to plant the seed whole."

We would add to this, dressing the land with common salt, charcoal, muck soil, and using no undecomposed manure.—*New Genesee Farmer.*

"*The potato rot.*—The first case of this disease which came to our observation happened three years ago. In a quantity of potatoes brought from Nova Scotia, about 10 per cent. of them were found to be unsound; some showing, on the removal of the skin after cooking, a dry black spot, covering frequently one-half of the potato, and often leaving the other half perfectly good and mealy; some of them, on breaking open, emitting a strong disagreeable smell, and showing the color of the potato to have changed from the natural white to a dingy yellow. These last specimens of the disease were in different stages of progress, like those having the dry black spots; but they differed from these last, by affecting uniformly the entire tuber. In some of them, the color had but slightly changed; and though the smell was perceived somewhat, yet the potato was eatable. In others, the smell

had become so offensive, that, although it could not be discovered till the potato was cut or broken, it was immediately thrown away. We did not then pay much attention to the disease, supposing it to have arisen from some local peculiarity of soil or cultivation, and not a matter of much importance, as it did not show itself to any serious extent.

"Last year we heard much of this disease in the middle States, where the crop was very much lessened; and in the autumn, it was found to have made its way to some extent in New England, and to have slightly affected some fields in this vicinity. We had some excellent potatoes raised in Newbury—a fifth part of which, probably, during the winter, were infected with the dry black spots, in some instances covering and destroying the whole tuber; and some Nova Scotia potatoes, which we were called to observe during the winter, and which were put into the cellar in good order, sound as those of the preceding year, were found in a short time to have become completely rotten, and, on opening the barrels, a mass of semi-liquid matter, occupying not more than half the space, was found. This decomposition had proceeded so far and so rapidly, that we were disposed at first to attribute it to the potatoes having been frozen before they were placed in the cellar; but as similar cases have appeared where there was no possibility of frost having reached them, it was no doubt the effect of disease. This year, the disease has affected a great many potatoes in New England, as well as in the middle States. In New Hampshire, its ravages have been very great; how far it has prevailed in this vicinity, we have not yet ascertained. We had placed in our cellar, about six weeks since, several barrels of excellent potatoes, raised in Newbury, equal to the best Nova Scotia or Irish apple potatoes we have ever eaten, and which, on repeated trials, showed not the slightest symptom of disease; but, within the last three weeks, have discovered that they are rapidly becoming infected with the black spots, and a few of them are already entirely soft and rotten.

"We have found, on inquiry and research, no satisfactory cause assigned for this disease. Some attribute it to the atmosphere; some to the soil; and others to an inherent disease in the tubers themselves. This last, as far as the explanation goes, is probably correct; although on newly broken-up sward land, it is said, the disease does not make its appearance. This kind of land, we believe, has always produced the best potatoes; and the evidence is not yet conclusive that the ravages can be stopped by planting on such land, because it has been found that potatoes which, when dug and placed in the cellar, were in a perfectly sound state to all appearance, have sometimes been entirely lost by the disease before spring.

"We find that this rot has prevailed in Germany, England, Ireland, Scotland, the United States, and Nova Scotia, for several years; but not until within the two last does it appear to have been so extensive in the United States as to excite much interest and anxiety among farmers. Associations of farmers and agricultural chemists in Europe have been busily engaged in investigating the nature of the disease, but have arrived at no satisfactory conclusion. The most plausible opinion, which was first advanced by a distinguished German writer, and which is adopted by the large cultivators in Ireland and Nova Scotia, is, that it is owing to the continual replanting of the same seed; and that, to preserve the potato, new varieties must be frequently produced from the seed.

"In Ireland and Nova Scotia, the disease has been known, to some extent, for nearly thirty years; and in Ireland, we are told, the far-famed

apple potato had become so constantly infected with it, that its cultivation was some years ago entirely abandoned, and it has become now extinct. In Nova Scotia, the progress of this distemper among the potatoes seems to have been somewhat singular. It has for a series of years been found to pervade particular farms—sometimes appearing in the stalk, like rust, long before the potato has arrived at maturity; and, on cutting open the young root, the disease is found to exhibit itself in black spots throughout the inside of it. At other times, the distemper has appeared after the potato has been harvested and put into the cellar—the first intimation which the farmer received being an offensive smell arising from their decomposition; and experience has taught them, in this contingency, immediately to cull over the whole mass, and remove every defective potato, as it has been found rapidly to spread over the whole if this is not done. It has sometimes broken out suddenly, and spread from farm to farm, and cellar to cellar, lingering a few years, and then entirely disappearing for a time. After trying many remedies, the farmers in that region adopted the plan of planting the balls, and thus procuring new seed, which, in two or three years, arrived at maturity and full size. We should be inclined to copy their example in this respect, and also to seek for other remedies—such as planting on sward land; ploughing in, or depositing in the hill, lime, salt, or some other substance, which could do no harm, and might operate as a preventive. In particular, where there was any fear that the potatoes in the cellar might become infected, we should be inclined to try putting in occasionally a layer of lime among the potatoes.

"Our farmers, generally, are not careful enough to make experiments, and note the results. If experiments are carefully followed up, and the results accurately noted, an immense fund of knowledge is ultimately gained, even if not more than one in a thousand proves successful. There is an aversion among many farmers to carefully making and recording experiments, which are of great disadvantage to themselves and to others. We recollect, several years ago, on a small spot of the old garden soil, we lost our potatoes by worms, for two successive seasons—most of them being found so badly eaten, on digging, as to be unfit for cooking. The third season we tried the experiment of putting nearly a teaspoonful of salt into each hill at the time of planting. The experiment was successful; and we had a fine little crop of entirely fair and good potatoes. We lost the garden the next year, and had no opportunity to try the experiment any further."—*Newburyport Herald.*

Rot in potatoes.—"Mr. Editor: I had a field of a little more than an acre, on which I gathered 300 bushels of potatoes. As many as one-half in measure are more or less affected with the rot. It commences on the outside of the potato, soon encircles the whole of it, and quickly becomes rotten; that part which was first affected rotting soonest. Those potatoes which lay near the outside of the hill were generally the best; while those which were in the centre, amongst the manure, (for it was manured in the hill,) were specked or half rotten. The potato that I planted was principally of the kind called blue-nose; these are most hurt. I had about forty bushels of the long red, in the same field, by the side of the others, which were but little injured; and a few bushels of the Chenangos, that were good and healthy. My neighbors' potatoes are affected similar to mine; theirs are the blue-nose. They are affected, more or less, in fields all over town, and in the adjoining towns, so far as my inquiries have extended;

and some farmers let them remain in the field, concluding that they are not worth digging.

"Now, as to the cause, we have no knowledge to guide us; for the oldest inhabitants that I have conversed with never remember the like happening before. There are various opinions. Some think they are diseased, poisonous, and have communicated their effects to those that look well, and they are not eatable. Others are of the opinion that a worm or insect has done the mischief; but I have examined a great number, in their different degrees of decay, and I discover nothing with the naked eye. The conclusion that I have come to is this: As we had no rain in this town and vicinity from the 4th of August to the 26th of September, which wetted the ground to the depth of an inch, (during this interval of time the sun had most of the time shone bright, and very hot for this season of the year,) the ground being very warm, and no rain to cool it, those potatoes which had arrived at such an age in their growth became sun-baked or burnt; the vines died immediately, and they began to rot. Potatoes placed near a warm fire, and suffered to remain there some time, and then placed in the ground, or on the ground, will be affected in a similar way. If any one will offer a better reason, I should like to hear it. Yours, &c.

"L. W. T.

"Upton, *October* 7, 1844."

"We learn, from various quarters, that the long-red potatoes are not much affected, if any, with rot. We should like to know if this is generally the case."—*Editor Massachusetts Ploughman. October* 14, 1844.

"The last Amherst Express contains an interesting article (which we attribute to Professor Hitchcock) on the cause of the extraordinary and disastrous failure of the potato crop at the present season.

"He expresses the opinion, that the failure of the potato crop this year is the result of disease. And, by way of showing how he comes to this conclusion, he remarks that the tops failed first, and appeared as if they had endured hard frosts. And as it is in the leaves and stalks that the juices and other principles that nourish the roots and tubers are prepared, if these fail, the potatoes must be stopped in their growth. They do not ripen, and of course are liable to decay. Like all unripe fruit, they are unpleasant and unhealty. He expresses doubt in regard to the cause of the disease. He thinks, however, it must be something derived from the atmosphere, since it is so widespread. He inclines to the opinion that the season has been too wet for this crop; though, by reference to Professor Snell's register of the amount of rain that has fallen in Amherst during the months of June, July, and August, he finds the quantity to be less than for two years past. Still, though he doubts not the entire accuracy of Professor Snell's account, he is certain that his own garden suffered exceedingly from drought during the last three years, while this year it has been rather too wet. He reconciles the apparent discrepancy by reference to the fact that the rains have been more equally spread through the season than in the two years previous; and, hence, that the amount of rain in a season is a very poor index by which to judge of the moisture and dryness of the soil. He is confident that the ground in this region has been too wet for potatoes; and he finds that in dry land they have suffered less than in wet soil. He therefore infers, that it will be found that in those parts of the country which have been dry, the potato crop will not suffer much in this

way. He thinks it very possible that the electric state of the atmosphere may have something to do with the matter.

"With regard to the supposed poisonous quality of potatoes affected by this malady, he remarks that all unripe fruit is more or less unhealthy, and that this is about all that can be said concerning these potatoes. There is no peculiar virus in them that need excite a panic. Though the potato belongs to a poisonous tribe of plants, cooking renders it harmless. And as there is no danger that man will eat potatoes raw, he need have no fear of eating them, provided he rejects those that are water-soaked. He would observe the same rule in regard to the lower animals—boil the potatoes given them, and the danger will be small. He advises to dig potatoes as soon as vitality has nearly left the tops and roots, and to spread the sound ones out in the sun for several days, until thoroughly dry, before they are laid in a pile."—*Northampton Gazette.*

"We publish the above as a curiosity. Farmers are puzzled to find out the cause of rot in potatoes; but if they can get any light here, it is more than we can find. The season is here called a wet one, and this is assigned as the cause of rot. The truth is, the season has been uncommonly dry in one-half of New England; and in New York, where the rot has prevailed most, we do not learn that the summer has been uncommonly wet.

"But the remedy—look at the remedy for rot in potatoes. The writer advises to spread the sound ones out in the sun for several days, until thoroughly dry.

"We should as soon think of soaking corn before grinding, as of drying potatoes several days before housing. The sun and air soon render them unfit for use. We call this dry book-farming.

"Captain Abel Moore, of Concord, tells us, while writing this, that potatoes intended for seed ought to be laid in the sun to dry before storing them. He thinks they will not sprout so soon in the cellar, and will come forward sooner when planted. This may be so with all kinds of potatoes. Let us know what others think on this point."—*Massachusetts Ploughman, October* 12, 1844.

"*Care of potatoes—exposure.*—Mr. Editor: Being a subscriber to your valuable paper, permit me to say a word, through it, concerning the article found in the Amherst Express, and which you attributed to Professor Hitchcock, respecting the potato rot. With all due deference to the opinion there advanced, I think the writer, whoever he may be, entirely mistaken when he says the season has been too wet for this crop; for it was certainly very dry in this region, during the months spoken of in that article, and for some time after they were found to be rotting. But there is a great falling off (say from one-fourth to one-half) of the crop in this section.

"I find the rot the most destructive among those varieties which have been the longest propagated, while it is less so among those more recently introduced from the balls. I planted a kind (by some called Mohawks, which I have known for thirty years,) in the same hills with a kind called Western reds, which were more recently introduced, and have invariably found, on digging them, the present week, that one-half of the former are wholly rotten, or so nearly so that I left them on the ground, while not one the least defective was found among the latter.

"But, sir, what shall I say about the writer's mode of preserving them when dug? Profound chemist! Surely, Mr. Editor, you rightly remarked when you said 'dry book-farming, this!' Why, sir, I supposed that every

boy large enough to dig potatoes knew that to let potatoes lie exposed to the rays of the sun, one half day even, had a tendency to injure them; and I am of the opinion that potatoes spread in the sun for several days, agreeably to the directions of the writer above named, will be found to have acquired a property from that luminary, or from the atmosphere, or from both, (perhaps they imbibe oxygen from the atmosphere, which may tend to render them poisonous,) which will disqualify them for the use of man or beast. In proof of this position, I will adduce a little of my practical experience in point. I exposed about a bushel of the kidney potatoes to the sun in the open air, and, on examination a few days after, I found that their upper surface had become changed from white to green; and that although they remained perfectly sound, as when first left out, yet they smelt strong; and on cutting and tasting them, their interior was found as green as their exterior, and they tasted as strong as they smelt.

"In regard to the time of digging, and the mode of preserving them, I found, on inquiry, that many were inclined to dig early, as they said, in order to save them; but such persons were unable to separate the good from those which at that early part of the season were imperceptibly defective; and were obliged, after letting them remain a few days in their cellars, to carry them out again, a filthy mass. Others concluded it would be better to let them remain, good and bad, in the ground, as long as they could, and not freeze up, when, on digging them, they might with safety put those that then appeared fair into the cellars; and I think this is the more judicious course. I have just dug mine, and find that the defective are obviously so, and need not be mistaken. How admirably potatoes keep in the ground! Why, sir, it is as natural for them as for chipmunks and woodchucks to remain in the ground. And were potatoes as well secured from the frosts, light, and atmosphere, as are those quadrupeds, we should find in the following spring, that, instead of coming out shrivelled and ugly, resembling those animals, they would come out improved in appearance and flavor.

"There are various ways of preserving them in the cellar, (though many prefer burying them deep in the sand upon a side hill, in order that they may not be injured from rains,) better than the usual mode of turning them down upon the cellar bottom; for, when thus treated, they usually taste of the ground. In order to keep well, they should, on being taken out of the ground, be put immediately into tight bins, (the more dirt with them the better,) which, when filled within about six inches of the top with potatoes, should have a covering, as of straw or boards, or perhaps of dirt, sufficient to exclude them from the light and air.

"ISAAC HOLMAN.

"NORTH ADAMS, MASS., *October* 26, 1844."

"All experience is uniform in showing that potatoes should never be exposed to the influences of the atmosphere. How rich when cooked as soon as they are dug, provided they have had time to ripen in the ground. Wet weather could not be the chief cause of the rot, for in New England it has not been a wet summer. Within 30 or 40 miles of this city it has been an uncommonly dry season, including the whole of September, when potatoes rotted most."—*Editor Massachusetts Ploughman.*

"The following are a few facts which I have collected from observation and inquiry:

"1st. Potatoes in this vicinity have rotted in grounds naturally both wet and dry—perhaps a little oftener in the latter. Those potatoes slightly hilled in hoeing have suffered most. Observe: I do not give this as a reason, but simply as a fact.

"2d. The rot has prevailed most in ground most highly dressed with barn manure, especially if placed in the hill. When potatoes were planted without any manure, they have rotted very little. Two pieces on similar ground, (rather wet,) the one manured from the barn, the other with hair, lime, fleshings, &c., from the tannery, both applied in the hill; the first rotted badly, the other very little. Two pieces, the first dressed broadcast, and in the hill, from the barn; the other broadcast, with a compost of barn manure and swamp muck, muck and ashes, and clear manure, both dry—the first was planted early, the latter late; the first rotted in the field, and being dug in the hot weeks in September, rotted after being put into the cellar; while the latter, dug at odd jobs from the middle of September to the middle of October, suffered very little. This piece had plaster put on at the time of planting, and after the potatoes were up.

"3d. The Chenangos have rotted most, the old whites and yellows next, and (of the kinds raised to any extent here) the reds have rotted least. In some instances, the tops have rotted near the surface of the ground, and come, when pulled, without drawing any earth or potatoes with them. Sometimes the rot causes the potato to become white and hard—a sort of dry rot. In others, it is wet—changing the potato to a mass of putrid matter, giving out an extremely offensive odor. Sometimes the heart of the potato becomes decayed, leaving the outside fair; while others rot upon the outside first.

"4th. It is a fact, too, that stock and swine fed upon these potatoes, partly decayed, have, in some instances, been evidently injured by them. Others, having been fed liberally from the same, have received no detriment.

"These are a few statements which I can substantiate at any time. I send them to you, to use in any way that will best promote the objects we have in view, viz: detecting the cause, and finding a remedy for the disease. Disease I have inadvertently called it. Perhaps I am in error here: it is the very thing to be decided; and I would not arrogate so much to myself. It has been by many here (being a new thing under the sun to them) attributed to the extremely hot weather during the last week in September; but, if that were the cause, why did not pieces on similar ground, and under the same cultivation, suffer alike? By others, it has been ascribed to drought; but, if this were the cause, why have some wet lands, and wet places in certain pieces, rotted more than the dry lands near by? In this particular, nothing seems to be uniform—the rot prevailing sometimes in wet, at others in dry soils. Light on the subject we earnestly seek.

"Yours, with much respect,

"S. F. PERLEY.

"NAPLES, *October* 17, 1844."

"☞ Our Naples correspondent has our thanks for the above facts and comments. He agrees, in the main, with most farmers who have taken particular notice of the rot. It is certainly difficult to account satisfactorily for this unusual visitation. We are not very confident that we are correct, but we will suppose the extreme heat of September is the chief cause of the rot, and see how that supposition consists with the other facts of the case.

"That heat is the chief cause of rot, generally, in fruits and roots, none will deny. Apples, in heaps, always rot sooner in hot weather than in cool weather; and potatoes and turnips are often spoiled by rot when they are put in large heaps, in cellars, early in September. Extreme heat, therefore, without any unnatural moisture, will cause potatoes to rot.

"All will agree that September was unusually warm. No one can show a whole week in that month, within forty years past, of such hot weather as we felt in the latter part of that month. The air is often as hot in July, and not often hotter; but we have reason to suppose that the long continuance of hot weather in September caused the earth to be warmed more and deeper than a hot turn in July will do. The sun and air cannot warm the soil so deep in the summer months as in September, for the same reason that June, with a vertical sun, never has the air so warm as the air of July. So, also, it is usually warmer, each day, after the sun has passed the meridian, than when he is directly over head.

"Now, supposing our conjecture to be right, let us see whether all the other facts that have been noted correspond, or whether any of them are irreconcilable with the supposition. All our correspondents agree that grounds highly manured from the barn yard have more rotten potatoes than when none is applied; and that when it is put in the hill, the case is worse than when it is spread over the ground. These facts corroborate our conjecture, for all know that barn manure increases the heat of the soil.

"Another agreed fact is, that sandy loams have a larger proportion of rotten potatoes than clays have; and all know that sandy loams are warmer than clayey loams. We have yet heard of no instance, in Maine, of red potatoes rotting on cold clays.

"But why have Chenangos and blues rotted more than long reds? We believe the fact to be, that early Chenangos were uncommonly good, and free from rot. We heard no complaint of any that were dug as early as August; they were not exposed to the heat of September. But late Chenangos, blues, and other kinds that ripen earlier than the long red, suffered more, because they were more ripe; for all ripe fruit and roots rot sooner than the unripe; and the long red seldom ripens before the frost comes; it often remains unripe till spring, when it is found rich and good. Oranges and lemons are plucked in the West Indies while green, otherwise they would rot on their passage.

"But some potatoes are more hardy, more enduring than others; the long reds have now held out longer than any other kind, and rather improve with length of years. They may resist decomposition longer than common potatoes.

"Another fact stated by our correspondent, and confirmed by numerous witnesses, is, that potatoes which were hilled up most with earth suffered least. In cool summers, potatoes yield best, when they are not planted deep; but many of our visiters tell us this season that their deep-covered potatoes are better than those which were buried slightly. Now, it is well known that farmers are much inclined to put less earth around their plants in hoeing than they formerly did, and that they make no hill for their corn. The objection to hilling corn is, that the roots are buried in cold earth. May not the modern practice of hilling but slightly have some effect to produce rot in a very hot season?

"On the whole, we have no facts presented that militate with the sup-

position that the extreme hot weather late in the season, when the earth must have been heated uncommonly deep, was the principal cause of the rot.

"The only objection to this supposition, in our own mind, is, that, in New York, and in some other places, the same complaint of rot that we now hear was made last year, when September was not an uncommonly hot month."—*Editor Massachusetts Ploughman.*

From the New England Farmer of October 30, 1844.

We had marked, for transfer to our columns, an extended account (given in the London Gardener's Chronicle) of the late discussion at Glasgow respecting the causes of failures in the potato crop; which latter (as our readers may already know) has been for several years similarly affected in Great Britain, as it has for the two last years in portions of this country. In preference to publishing the lengthy account above referred to, we copy the following synopsis of it from the Dublin Farmers' Gazette, which gives the sum and substance of the discussion:

"*Potato failures.*—In last week's paper we had the pleasure to copy from a Scottish contemporary a report of the highly interesting discussion which took place at one of the forenoon meetings of the Scottish Agricultural Chemistry Association in Glasgow, on the subject of potato failures. This meeting had been announced for some time. Some very eminent agriculturists attended it; and nothing can better show the exceeding difficulty of the question mooted, viz: 'What is the cause of the potato failures? and is there a remedy for them?' than the discrepancy of opinion advanced on the occasion.

"The general opinion of scientific agriculturists appears to be, that there is a liability inherent in every plant which has, for a long period, been cultivated in the same soil, to become deteriorated; hence the universal belief in the advantage of changing the seed; and that, in the case of the potato, the most likely means of avoiding failure would be to procure a new generation of plants from seed (not tubers) of a healthy crop. But, in the discussion to which we are referring, Mr. Girdwood's experience gave the death blow to this cherished opinion: the seedlings were found to be as liable to decay as any others.

"Plant your potatoes whole, and use only such seed as have the eye plump; protect from frost, and (says theory) you will have no failures. Not so fast, says Mr. Burnet, of Gadgirth; I have done all this, and still have experienced failures.

"Mr. Alexander, of Southbar, had never witnessed a failure in early planted potatoes. How many, within a few miles of Dublin, would give a great deal to be able to say the same truly. Why, early planted potatoes, with us, are the most liable to failure; and as to this gentleman's other statement, that the failure of potatoes is traceable to some ill-treatment, especially by stowing them in large masses—did it not occur to him that, up to 1832, no failures were caused by such treatment?

"Mr. Allison, of Mears, stated that potatoes taken for seed from those which, for two seasons, had not been cut, would not fail. It is, we fear, mere assertion. Whole potatoes, although not so liable to failure, we believe, as cut ones, still, it is notorious, do fail.

"Mr. Anderson, from the north of Ireland, as appears from his statement, has been most successful in his efforts to avoid failures; and the

means he adopts (viz: liming the ground, planting only in drained land, pulverizing the soil well, and not leaving either the manure or seed exposed to the effects of the sun and wind) are based on sound practical knowledge. His experience, however, that potatoes which have been prevented from blossoming are not less liable to fail, does not accord with that of others.

"The successful practice of Mr. Reed, as mentioned at the meeting by Sir Robert Bateson, of digging potatoes intended for seed before they are quite ripe, and leaving them on the ground to be dried in the sun, although Professor Johnston declared that he had never heard of it, is known and practised successfully by almost every gardener with his ash-leaved kidneys intended for forcing.

"And as to Mr. Fleming's experience, that the cup potato does not fail, we can only say that such is not the experience of the farmers of this country.

"This discussion was, in fact, an epitome of the innumerable essays which for the last twelve years have appeared on the subject of the potato failure, and which may be resolved into this—that we are utterly ignorant of the cause of the failures; and that our only chance of avoiding them is to use mountain-grown (which often means unripened) seed, which has been preserved from heating in narrow pits; to plant in a dry, deep soil—using moist manure, and not permitting the seed to lie exposed, even for a few minutes, to the parching influences of sun or harsh wind."—*Dublin Farmers' Gazette.*

"I planted between one and two acres—mostly on new land, with very little manure; hoed them once, and got about 250 bushels to the acre. The rot, so much complained of in other places, has affected some, but not very badly; perhaps I should have thought but triflingly of it, had it not been so universally spoken of elsewhere. I think I have seen the like before, or something similar to it. It is what I should call the dry rot. I have examined some of the injured ones, and can find nothing that appears very singular or unaccountable in or about them. A similar rot occurred in my crop of 1838, (I think it was:) they were pink-eyes I then raised, which were injured. The long reds, to my knowledge, were never so affected. The most of those examined now in a partial state of decay are found, where the least speck of rot has begun on the outside, with the stem and heart also affected in about the same ratio. Those deepest in the hill are generally affected the most. My crop the present season is as mealy and delicious as any I ever used. Among the several varieties raised by many this year, there appears considerable difference as to their liability to that disease—if so it may be called. The long reds, or La Platas, are not touched; while the buckeyes, (a new kind with me,) the whites, pink-eyes, and Irish apples, are more or less affected.

"As to the cause of the rot, we hazard no conjectures. Were it not for the many cogitations of others upon this point, we should be likely to think it owing to some peculiarity in the season. It may be so still; time may tell. The present has generally proved a good season for potatoes. If the rot should come on again the next year, and the next after that, we shall be likely to think more seriously of it. Let us wait and see.

"As to the poisonous effects of this rot, we have no faith in it, further than we believe all decayed vegetables unwholesome for man or beast.

"Respectfully,

"B. F. WILBUR.

"BUTTERSVALE, *October* 29, 1844."

"We think it best to wait till another year before we decide too positively. As to the peculiarity of the season being the cause of rot, has not September been very peculiar?"—*Ed. Massachusetts Ploughman, November* 16, 1844.

"*Disease of the potato crop.*—A good deal of apprehension is manifested by farmers in this region, as well as elsewhere, in consequence of the appearance of the rot, or disease, among potatoes. The evil does not appear to be very general, as yet, in western New York; but it has appeared so suddenly in so many places, and is so virulent in its nature, that it naturally excites many fears for another year. It is, indeed, a serious matter to the farmers of this country; and it becomes every one to try to ascertain, if possible, the cause, and means of prevention, of the malady. Many theories and speculations on the subject are afloat, both in this country and in Europe; but we have seen none, as yet, that, in our mind, seem in accordance with reason, or confirmed by experiments. We will allude to some of these next month; in the mean time, we shall be glad to receive communications on the subject from any persons who have made observations in regard to it.

"Some things, however, appear to be certain, and may be of immediate advantage to our readers:

"1st. The disease is not confined to any particular kind of soil or locality. Some have informed us that it appeared only in dry soil, and others in moist.

"2d. It is not confined to any particular kind of potatoes, though in this region the Mercer and long pink-eye are the most affected.

"3d. The potatoes, when affected with the rot, are poisonous to animals, and consequently should not be used for feeding.

"4th. The disease spreads more rapidly among the potatoes, after being dug and placed in a heap, than while in the ground; consequently, if it is thought they are affected, it is better to delay digging till late in the fall. Mr. Hudson, of Wayne county, informs us that a neighbor of his, perceiving that his potatoes appeared very ripe, dug them, and placed them in a loft of a mill for a few days to dry. On passing near the window one night, he noticed what he thought to be a light in the room where the potatoes were stored; and, on going in, he was astonished to perceive the whole heap covered with phosphorescent light, and emitting the odor peculiar to rotten potatoes. It was soon evident that the disease had spread through the whole heap, although, when dug, very few rotten ones were discovered, and they were thrown out.

"5th. The presence of the evil may generally be detected in the field by the rapid and premature decaying of the tops, and the smell of rotten potatoes perceptible on walking over the ground. On digging, the affected roots have somewhat the appearance of having been frozen and thawed, though they are not commonly so soft. Sometimes the decay is in spots, and partially covered with a small white fungus or mould."—*New Genesee Farmer, October*, 1844.

For the Boston Cultivator.

Rot in potatoes.—Messrs. Editors: Last year (1843) I found, when I began to dig and get in my potatoes, there was a considerable number rotten, and a great many tainted, which I took great care to have picked

out, as all my neighbors were complaining of their potatoes being in the same situation, and I had them put in the cellar. But, about the middle of December, my family complained of the bad smell in the cellar; upon which I examined, and found the potatoes in a bad condition; and I took them out of the bin, and picked them over again; and, when returning them into the bin, in every layer I put about half a peck of slaked lime, and mixed it well through them; and so on till all was in; which I do believe stopped the rot and bad smell, as there were but very few found affected afterwards.

This spring, when I began to plant my potatoes, I took about a tablespoonful of slaked lime and put it into each hill; and when they were up, and before they were hoed, I made a mixture of 8 bushels of leached ashes, 2 bushels of lime, and 3 bushels of ground plaster, and stirred them well together. I made a scoop that held about one gill, and I put this full of the mixture on each hill, close to the stalks; and I found, when I began to use them in the summer, that they were all sound, and continued so; and I had not one rotten potato when I took them up in October, although my neighbors on both sides of the farm had scarce any sound ones to get in. So I must think that what I did to my potatoes was the cause of my being so successful.

I am, respectfully, yours,

JOHN S. NETTERVILLE.

PALATINE BRIDGE, *Montgomery county, N. J.*

No. 9—(2.)

Reported for the Farmer and Mechanic.

Meeting of the New York Farmers' Club, November 12, 1844.

DISEASE IN POTATOES.

Mr. MEIGS remarked, that he was inclined to think that a long period of domestication may have had a bad effect on the potato. If all our art fails in keeping in good condition our civilized potato, we may have to resort to its little savage ancestor for a new race. I have sent to South America for them, that the experiment may be tried.

SAMUEL WIGNALL, of Warren county, stated that he had planted sixty bushels of potatoes this year—some upon old, and some upon new land. Upon the old, about one-third of the crop was affected. He had planted some Irish cup potatoes upon the old land; they were similarly affected. His new land was cleared within one year's time. Upon the new land the potatoes were sound.

Mr. WAKEMAN. Can you say, Mr. Wignall, whether lime or ashes were used upon your land? Whether, in clearing up the field, ashes were left by burning the forest leaves, &c.?

Mr. WIGNALL. The new land was burnt off; of course, ashes were upon it. The potatoes were planted upon the virgin soil.

Mr. JOHN ELWELL, of Tioga county, New York. Until within about

two years, my potatoes were good. Last year I had two fields of them. On one there was scarcely a defective potato to be found; on the other, one-fourth were diseased. The potatoes on elevated ground, two or three years in cultivation since clearing, were sound; the others, on land seventeen years, to my knowledge, under cultivation, were bad. Dr. Beers had a variety of potatoes which turned out far better than others—a pale and smooth potato, four inches long. In Wisconsin, the potatoes are well grown, and a great crop. For this disease, I think a variety of causes may be assigned. Atmospheric influence is probably one, affecting the potato like rust in wheat. The evil begins at the top of the potato stalk; and wherever the stalk is defective, there also is the potato more or less defective. In my potatoes, some were sound outside and bad within; in others, the surfaces were affected. The disease may proceed from some chemical action in the atmosphere, or from peculiar location, as high or low, new or old land; but I wish to impress it upon the institute, that some varieties are more affected than others.

Mr. Meigs. The New England Farmer speaks of 1832 as a year in which the disease of the potato was noticed. I noticed it that year in my potatoes. I had never seen it before. That was the first year of the visit of the Asiatic cholera.

Mr. J. Smilie, of Schenectady county, New York. I found this potato disease very bad two years ago. My potatoes, planted very early, for new potatoes, were good this year. Last season, my potatoes being planted late, (25th June,) corn having failed, grew very rank, and were affected by the disease.

Marcus J. Blakesley, of Coleville, Broome county, New York. The potatoes were affected differently, in different sections of the country. The rot commenced last season, when the disease was like rust in wheat. Upon pressing the stalk, water burst from the sap vessels, and the bark would separate from the stalk. This season, the disease was like matter in a sore. Upon pressing the stalk, a substance like matter was forced out of it; the bark separated; there was mould at the eye. There appears to be a deficiency of starch; the woody fibre is sound. Last season, the potatoes dug early generally proved good. Those last dug were affected. This season, those first dug proved good. I did not remain to see the last dug. My uncle tried the following experiment with his potatoes: He limed two rows, ashed two rows, and put gypsum (plaster) on two rows in the old way. In these experiments, fresh stable manure was used, together with the articles named. He found those treated in the old way the best; those limed the worst. Coleville land is much of it hardpan clay. The upland hardpan sward is better for potatoes than the loam of the valleys. Some of our farmers deem it as necessary to have sound and healthy potatoes for planting as they do sound and healthy animals for breeding. Our best potatoes are flesh-colored. Our pink-eyes and Mercers are the worst. Some of the flesh-colored failed.

President. Were any of yours imported?

Mr. Blakesley. None that I know of. The seed potatoes were from the neighborhood.

Mr. Minor, of New York, stated that Mr. James Hay, of Westchester, had informed him that his potatoes, raised with farm-yard manure this season, were diseased, so that he threw away 20 per cent. of them; that on land where he had used concentrated manure he had good potatoes.

Mr. Butler. Is the concentrated manure of which you speak soluble, or is it insoluble in water?

Mr. Minor. It was the poudrette; a part of it is soluble. When properly prepared, the greater part of it is insoluble in water.

Mr. Blydenburgh. There is a difference in the potato, as to liability to this disease. The Mercers were diseased last year. I was afraid to plant them this year. I went to my neighbors, and obtained some good ones; also, some from the State of Maine. The red ones turned out almost all good, while the Mercers were one-third diseased.

President. Had you any foreign potatoes in your vicinity?

Mr. Blydenburgh. None that I know of.

Colonel Clark. I believe that this disease originates from the attack of insects or animalculæ, which prey on the leaves; thus injuring the respiratory organs of the plant, and depriving it of the elemental food which is absolutely necessary to the formation of the starch in the potato; the pulpy portion, deprived thus of its due proportion of starch, becomes perishable, and decays. So melons and pumpkins, when their leaves are destroyed, dwindle and perish. From similar causes, the tubers of the potato suffer for want of a proper supply and assimilation of their food.

Mr. Holmes. I am intimate with Mr. James Hay; I know his farm; it has a cold soil; poudrette brought the crop two or three weeks earlier than usual.

Colonel Clark. As to poudrette, the effect of it is vigorous vegetation. I examined the wheat field of Mr. Townsend, near Astoria, this season; the growth was great; the yield 35 bushels per acre, weighing 60 pounds to the bushel. It was attacked by the fly; but it appeared that its growth exceeded the injurious power of the enemy, who was found in the outer sheath, not having power to penetrate the grain. The field was also remarkably free from all weeds, and was one of the most beautiful crops I ever saw.

Mr. Browne. I offer an opinion that this potato disease is an imported one. It had existed some eight or ten years in Great Britain. When there was a scarcity of potatoes here, two or three years since, we imported large quantities from thence; the disease, before that time, was unknown here.

Mr. Teschemacher, of Boston, tried, by microscopic examination, to find out the cause. He discovered in the potato a growth of fungus, which is a plant analogous to the mushroom family. It is also seen as a blue or green mould in most places; it is often seen in apple cores, and in the interior of nuts. These fungi seeds are invisible to the naked eye; they are readily carried about by winds, and will penetrate wherever air will. Being once introduced from Europe, their extensive dissemination here is very easy. These seeds falling on the potato, in favorable circumstances as to moisture, &c., cause the disease. Mr. Teschemacher suggests the application of common salt to the soil; perhaps other chemical salts may answer the same purpose. The dry rot in timber is an analogous disease. Salt, chlorides, metallic oxides, &c., injected into the pores of timber, (kyanizing,) prevent the dry rot; and, in certain soils, these salts might prevent the disease of the potato. Dr. C. T. Jackson, of Boston, one of the ablest chemists in the country, is now engaged in examining this subject. This fungus, of course, germinates only in circumstances favorable to its growth. We all know the tendency of old lands to produce fungus.

Mr. Cooper, of New Jersey, selected those tubers which had the plumpest, fairest eyes, with success; and continued the same seed upon the same farm for forty years, without deterioration. The insect theory is not new; there being no insects preying on the potato that has not existed for many years, I do not think there is any thing in that. In some parts of the country where hay was scarce, the potato tops were cut at the time of their flowering for feed to cattle, and the tubers were afterwards found just as good and as abundant as if the tops had not been taken off.

Colonel Clark. That must have been in the infancy of their growth. When the insect seizes the tops, the tubers are deficient in starch.

Mr. Holmes. One single remark: In October last, I went to a boat to select my potatoes. There was a variety on board—pink-eyes, Chenangos, and others. I selected mine; some of them I found to be a little defective. There were some Carters among them; (the Carter potatoes were shown;) they were sound.

Mr. ———. Is not the father of that potato present?

Mr. Carter. Some time back, I made a report to the club on the culture of that potato, recommending that they be planted near the surface, so that water cannot stand upon them. Many have followed that recommendation. Potatoes so managed have remained good this season, as far as I can learn. The potato will not bear remaining very wet.

Mr. Ross presented potatoes, and explained the disease by showing that those planted having been checked by drought, and afterwards started by copious rains, sent out tubers which deprived the potato of its starch; thus causing disease in it. The new tubers form themselves from the substance of the old ones, without new tops of fibrous roots being produced. The diseased potatoes had been planted between the 1st of June and middle of July. Those planted before and after were good.

President. I rise to make a few remarks on this subject. This discussion may help us all for the next year's potato crop. Suggestions awaken others. By contrasting opinions and facts, deductions of value may be obtained. On our farm, last year, we tried potatoes where lime had been put the year before, at the rate of 60 bushels to the acre; it was on a part of our garden, which was also well manured at that time. Another trial was made on a field which had been well manured; sheep had run upon it. Both the field and garden are old, high, loamy land. No lime was put on the field. The potatoes in the garden were planted in April, and dug up in August; they were perfect. In the sheep field the potatoes were planted in the last of May or beginning of June, and we hardly had our seed potatoes restored to us. I am inquiring for results. One says the potatoes are less affected on new than on old land. Our business is to find the cause and the remedy.

Lime has been mentioned as tried, and of no avail. With us, it appeared to produce good results. We must go back to first causes. The wisdom of Providence ordains a special adaptation of soils. Rotation of crops is necessary, to save our lands from exhaustion. All old soil was once virgin. The science of botany tells us that plants run out their races. Our potato is over three hundred years in cultivation. Is it showing signs of exhaustion? Its essential ingredient is starch. One gentleman said that the starch was defective. What is the cause of that? It has been suggested to me, that some form of copper was needed. Sulphate of copper is said to be a preventive of rust in grain. This disease is compared to rust.

Cannot the science of chemistry throw some light upon the subject? In all this discussion, I see a brilliant proof of our want of an agricultural school, to which such questions of immense magnitude should be referred.

No. 9—(3.)

For the New England Farmer.

THE DISEASE IN POTATOES.

Mr. Breck: Mr. James Brown having kindly brought me some of the potatoes infected with the disease which has this year committed such ravages on this vegetable, I proceeded at once to investigate the subject.

The peculiar smell and the reputed poisonous qualities of this diseased potato made me nearly certain that it was a species of fungus—a position which I think has been confirmed by my examination with the microscope.

The appearances which I examined were—1st. A nearly black discoloration of the potato, just below the skin, penetrating one-sixteenth to one-quarter of an inch into the substance, and apparently through the skin, in little black indented tumefactions, like pustules. It is probable that in these holes the vegetation of the fungus first begins, and spreads underneath. 2d. On the surface of the skin, where these pustules were enlarged, there had produced a grayish slimy substance, of a very offensive smell.

The black mass, divided, in a drop of distilled water, exhibited under the microscope a number of long, oval, and very irregular shaped dark bodies, interspersed among the cells of the potato. Many of these cells appeared lacerated; but this might partly have been produced by the mechanical action of dividing, although I think not altogether. The grayish slimy mass was semi-transparent and indistinct, even when mixed with the distilled water, and exposed to the strongest light I could throw on it.

In order to discover a remedy for this disease, I decided on applying various substances to this fungus, with a view of effecting its decomposition, and examining their action under the microscope. The first application was salt; and the action of this was so instantaneous and decided, that I did not proceed to any other.

A portion of the dark substance was placed on a piece of glass on the microscope stand, in a drop of distilled water, and then thoroughly examined. A little salt, on the fine point of a penknife, was then added. A nearly instantaneous change took place. The dark-colored masses separated; much of them seemed to pass away; and, instead, there appeared numerous dark, slate-colored globular bodies, which I easily recognised as the spores, or reproducing bodies of the fungus. With the gray slimy substance, the effect was still more striking. All the indistinct slime disappeared, the mass became clear and transparent, and left nothing but these innumerable dark globules floating about in the drop of water.

It seemed to me, then, that the salt destroyed all the vegetation of the fungus—leaving nothing but the reproducing spores, which are probably indestructible by salt. The spores of fungi are the bodies by which they are reproduced and spread, and are analogous to the seeds of other vegetables; and these spores are generated in such enormous quantities, that many fungi, like this on the potato, spread with inconceivable rapidity; but,

in order to vegetate, they require certain favorable conditions and circumstances, which yet require investigation. These favorable conditions are, in my opinion, prevented by salt, as it destroys the fungus vegetation. Therefore, wherever the disease existed this year, I recommended a liberal supply of salt to be spread on the soil, and trust it will eradicate the evil. It is, at all events, a remedy which cannot do much injury, if it does not succeed.

During the examination of the black substance, I of course recognised the grains of starch, which appeared sound; but, wishing to know whether the fungus had affected them, I added a little iodine; the grains immediately took the usual purple color, and, I think, were not at all injured; indeed, it appears to me that the injury takes place by the rupturing of the cellular parts of the potato.

I am aware that it requires some practice to judge well of the appearance under the microscope; but I repeated these examinations six or seven times, and always with the same results; still, I should be glad to have them repeated by others, whether their correctness be confirmed or not. My microscope, being made by myself, is, of course, very inferior to those now manufactured in London and Paris; and it would be very desirable that some of our scientific societies should import one of these, the cost of which is too high for persons of moderate income. It might be made accessible, under certain conditions, to those desirous of undertaking such investigations as these; for there are many cases where the action of various substances on the causes of animal and vegetable disease is examined to very great advantage under the microscope, and effects seen which cannot be observed in any other way. Should any gentleman possessed of one of these superior instruments be desirous of examining this disease, I would request of him to look at the action of sulphate of iron, sulphate of soda, or of ammonia, or any other substance which can be cheaply applied to the soil as a preventive; and to give notice of his observations, either in your or some other agricultural periodical; for I see with delight any thing that can bring nearer to each other science and agriculture.

Yours,

J. E. TESCHEMACHER.

Boston, *October*, 1844.

No. 9—(4.)

THE DISEASE IN THE POTATO.

From the New England Farmer.

Mr. Breck: I am glad to see in your paper of the 2d the numerous communications stating facts and suggesting causes of the disease in the potato. A more dreadful calamity can hardly be conceived, than the destruction of a crop essential to the existence of thousands. On a subject of such general interest, any one may claim a hearing, and to be heard with attention. The remote causes of the disease are most difficult to ascertain, and, after all, must be mainly left to conjecture. But, for this, every fact in each man's experience is important.

I do not find a single supposition of your correspondents that is in any degree confirmed by my experience. My ground (less than an acre) was never ploughed since creation until this year; it is not, therefore, in the

common meaning of the word with farmers, "old;" it has not suffered from drought or too much wet; it has been manured as I have manured for the same crop these thirty years, and planted with the same variety of seed that I used thirty years ago—the "old-fashioned blue" and "long red," except the Chenango, a much later variety; and this last is the only one that I can ascertain is diseased. The vines were strong, and the seeds abundant.

The disease is hardly discernible, in many cases, until after the potato is cooked, when it shows itself in black blotches, like a *rooted fungus*, extending considerably below the surface, readily separating from the potato, which appears as if it had been frozen, and is more or less discolored. In some hills I have found much of the fruit quite rotten, and very offensive to the smell; whilst, in some cases, the same tuber was partially decayed, and the remainder apparently sound.

The only circumstance at all unusual in my planting or culture this year, is the fact that my Chenango seed was partially frozen—too much so to be fit for the table; and, in consequence of the great severity of last winter, this was doubtless the case in a thousand other instances. May not this diseased seed be the cause of the diseased progeny? A great proportion of the diseases of animals and vegetables, it is well known, are transmitted. Is not this disease of the potato only another instance?

Aitkin, in his little work on this disease, favors the idea here suggested, as does also a writer in the Highland Agricultural Society's Transactions. It is noticed by these writers as having existed in Europe as far back as 1815, and as having been particularly destructive in Scotland in 1835. A complete renovation, Aitkin says, is only attainable by raising new varieties from the seed.

WATERTOWN, MASSACHUSETTS, *October* 5, 1844.

No. 9—(5.)

To the editor of the New England Farmer.

THE DISEASE IN POTATOES.

Not having seen any communication objecting to the views I have taken of the cause of the disease of the potato, and which subsequent examinations have only tended to confirm in my own mind, I resumed the investigation of the subject. The results I now offer to you for publication. I have first to notice the idea that this disease arises from worms which are found in the decayed potato; and remark—

1st. That the worms are the same which are found in all rotten potatoes, from whatever cause the decay may arise.

2d. The potato decays previous to the worms appearing; for the worms are never found in the sound part of the potato, eating their way in or depositing their eggs. Nor have I ever seen the worms in that part of the potato in which the fungus has already commenced vegetating; it is only in the most rotten part that the worms exist, after the fungus has caused this decay.

3d. Salt instantly kills the worms, as any one may satisfy himself with the assistance of the common compound microscope.

Under the full impression of the existence of the fungus in the potato, two questions present themselves:

1st. Is the fungus the cause of the decay, or merely a growth on the tuber, already diseased from some other cause? And

2d. When, and in what part of the plant, the disease originates; and how is it propagated and disseminated?

The probability is, that the fungus is the cause of the disease; for the fungus appears on the skin of the potato, and can be traced by its gradually dark color penetrating from the outside, by degrees, into the sound inside; the outside fungus developing itself first, and producing slime and rottenness, while the inside yet remains firm and sound. If the fungus resulted from the potato first becoming rotten, and thus forming favorable circumstances for its vegetation, then the presumption is that we should occasionally (although perhaps rarely) find parts of the potato rotten *without* the fungus; which I, at least, have never yet seen. I have often seen heaps of rotten potatoes, without ever before observing this peculiar fungus, which, on account of its smell, cannot be mistaken. If this was, therefore, a disease merely affecting the rotten potato, and not the sound one, it would have been long ago, and much more often, observed. Dr. Wallroth, an excellent German botanist, who appears to have closely studied the fungus family, observes in the Linnæa, (a botanical periodical published in Germany,) vol. 16, for 1842, that he has ascertained the disease called there the *potato scab* or *wart*—a kind of swelling or tumor, ending in rottenness—to be a species of subterranean fungus, which he calls *erysibe subterranea,* of which he gives a long scientific description. I am not sufficiently versed in this subject to decide whether this description agrees exactly with the disease at present under discussion, but it appears to me to differ in several particulars.

The second question, as to the origin and propagation of this fungus, is one which presents great difficulties in its solution. These arise partly from the knowledge of the propagation of the fungus family being yet in its infancy, and partly from the want of means of pursuing the study of this microscopic subject properly. From the almost universal accounts of the tops of the plants having first died down, and thus indicated the disease, it has suggested itself to me, even if this fungus is really a subterranean species, whether it has not been propagated and disseminated by spores floating in the atmosphere, and attaching themselves to the *stalk* of the potato; or that vegetating and extending themselves downwards until they reach the point of junction with the tuber, there producing decay and the death of the upper part of the vegetable, and afterwards disseminating themselves through the tuber.

A parallel to this, probably, exists in the *mushroom*—a fungus which is naturally produced from horse-droppings, when, by being kept dry for a considerable time, they have arrived at a favorable state for the development of the spores. These spores have probably attached themselves to the stems of the hay which has been eaten by the horse, have passed through its stomach, and remained in an inert state until favorable circumstances have produced their development in the droppings.

I regret that I had not commenced this investigation early enough to have examined the stalk, and its junction with the tuber, with the microscope, on the first appearance of its drooping; as all the proof now to be expected from experiments can only be of a negative character. However, here are such results as I have obtained:

1st. One of these much diseased potatoes was cut in halves; each half was placed on half a sound potato, in perfect contact, placed under a bell

glass, in a damp dark atmosphere, temperature 57 to 62. In five days the sound potato was not in the slightest degree contaminated with the fungus or the worms.

2d. A whole diseased potato, covered with black spots, was placed under a glass in the same circumstances as experiment No. 1, in contact with a whole sound potato; the fifth day the sound potato remained uncontaminated and without worms.

3d. A whole and much diseased potato was buried two inches below the soil, which was damp, but not wet. A sound potato was buried in the same soil, two and a half inches distant from it; the temperature kept as before—57 to 62. In five days, this latter remained quite sound.

It is possible that five days is not long enough; I have therefore left them all in the same state, and shall not touch them for three or four weeks. Should any change take place, I will inform you.

As I do not seek to establish any favorite theory, I trust my remarks may incite to observation, and provoke discussion; and provided the practical and useful truth on this subject be discovered, I do not care much whether it be by myself or by others.

J. E. TESCHEMACHER.

No. 9—(6.)

THE POTATO PLAGUE.

From the Cultivator.

The disease which largely affected the potato crop in Europe and America during the last two or three years, (though in this country chiefly during the last season,) is exciting anxious inquiry among the community, and close observation among scientific men. Mr. Teschemacher, of Boston, has published the result of his observations; and we now add the opinion of another gentleman of New England, Professor Charles T. Jackson, who left the following hasty note, in reply to inquiries made while he was passing through this city:

"Albany, *September* 23, 1844.

"Dear Sir: While passing through the western part of New York, my attention was called to a peculiar disease which affects the potato plant; and, having heard something about it in Michigan and Wisconsin, I was anxious to examine the first potato field where the disease could be witnessed. This I had an opportunity of doing in or near the village of Trenton, N. Y., where a very intelligent farmer exhibited to us the ravages which had been effected by it in his fields. The disease was first indicated by numerous small drops of honey dew on the stems of the potato plant about a month ago. Then followed a rust, with death of the stems; and the disease was found to extend along the bark to the potato tuber, which is a subterraneous stem, and not a root, as some have supposed. I observed that the potato began to rot next to the skin, and the disease penetrated inward, in many cases, to the depth of half an inch. No fruit or potato balls formed on any of the diseased plants. The plants looked parched and blackened, as if they had been killed by frost.

"I learned that where lime had been used in the preparation of about a table-spoonful to a hill, there no disease has appeared; also, that after the vines had become affected, the best remedy was to cut the stems off close

to the ground. The good farmer in Trenton said that his crop had suffered very severely; and that where he had formerly raised average crops of 300 bushels to the acre, he shall this year raise but 50 bushels. The German population, who depend on digging potatoes on shares, will severely suffer this season. I would invite you, sir, to inquire into the origin of honey dew. I find various theories offered, but none of them satisfactory. I have heard the disease of the potato ascribed to the age of the plant reproduced continuallly from tubers; but this cannot be the fact, for no such distinction can be found in potatoes of various ages and kinds. The yellow, red, pink-eye, and Chenango, have all equally suffered this year. No peculiarities of soils or of manures appear to afford any explanation; for the plant appears to have been affected in one as much as another.

"The potato crops in Wisconsin, as I learn from a farmer just from there, have suffered severely; as have those of Illinois and Michigan.

"C. T. JACKSON."

Disease in potatoes.—We see, by the New England Farmer, that Mr. Teschemacher continues his experiments with a view to ascertain the cause of the potato malady. We have before stated that he has discovered a fungus attached to the potato; he is now of the opinion that the fungus is the cause of the disease. His reasons for the opinion are, "that the fungus appears on the skin of the potato, and can be traced by its dark color, penetrating from the outside, by degrees, into the sound inside—the outside fungus developing itself first, and producing slime and rottenness, while the inside yet remains firm and sound. If the fungus results from the potatoes first becoming rotten, and thus forming favorable circumstances for its vegetation, then the presumption is, that we should sometimes (though, perhaps, rarely) find parts of the potato rotten without the fungus; which I, at least, have not seen." Mr. T. observes that he has often seen heaps of rotten potatoes without having noticed this peculiar fungus, which cannot be mistaken, on account of its peculiar smell. He thinks, if it were a disease merely affecting the rotten potatoes, it would long ago have been observed. In regard to the propagation of the fungus, Mr. Teschemacher is induced to think, from the fact that the tops of the potatoes have generally died down, and thus indicated the disease, that it has been propagated by the seeds or spores floating in the atmosphere, and attaching themselves to the stalk of the potato; or that vegetating and extending downwards to the point of junction with the tuber, there producing decay and death of the upper part of the vegetable, and, afterwards, the decomposition of the tuber.

In regard to the idea that insects have caused the defect in potatoes, Mr. Teschemacher observes, first, that the worms which have been found in them are "the same which are found in all rotten potatoes, from whatever cause the decay may arise; and, second, that the potato decays previous to the worm appearing, for the worms are never found in the sound part of the potato, eating their way in or depositing their eggs; and it is only in the most rotten part that the worms exist, after the fungus has caused this decay."

Honey dew.—We would call attention to the remarks of Dr. Jackson and Mr. Boyd, in this number, relative to the defect in potatoes having been occasioned by "honey dew." The circumstance mentioned by Mr. Boyd, of the potatoes over which a carpet had been spread remaining green and healthy, while the remainder of the field was destroyed or much injured, is worthy of particular remark.

"WINCHESTER, (CONN.,) *November* 6, 1844.

"*Disease of the potato.*—Mr. L. Tucker: Among the various speculations respecting the disease of the late potato crop, I have recently heard a cause assigned, which appears to me more satisfactory than any I have seen in print. It seems that, on the night of the 15th of August last, there was a honey dew, (as it is called,) a glutinous exhalation with a sweet taste, which settled on the herbage and leaves of the trees throughout this region of country.

"A neighbor of mine informs me that a farmer of his acquaintance, in Hartford county, on the afternoon before the falling of this dew, removed a carpet which his family had spread out on his grass, and spread it on a part of an adjoining potato patch, where it remained through the following night and morning; and that, after the tops of the potatoes in the rest of the patch had entirely decayed, the tops which had been covered by this carpet continued green until fall; and that while the rest of the crop almost wholly rotted, the part under the carpet gave a sound and abundant yield. Another neighbor informs me that, on the morning when the 'honey dew' appeared, he heard a farmer say that it would kill the potatoes.

"Now, this honey dew is a phenomenon of which I have never before heard; but to you, and most of your readers, it is probably familiar. It seems, at all events, if it prevailed over the Eastern and Middle States at the time mentioned, to afford a rational and satisfactory solution of the much vexed question. A glutinous substance, covering the potato crops at the period of their most luxuriant vegetation, would stop the pores, and cause sudden death. The disease and death of the tops would cause the tubers to decay in the precise manner they have done.

"Please give your views on the subject, and oblige yours,

"JOHN BOYD."

Respecting the nature and cause of honey dew, we believe neither philosophers nor agriculturists are entirely agreed. It has been said that this substance is the exudation of insects called *aphides*, or plant-lice. That the sweet substance which has been known to exude from these insects has been sometimes called "honey dew," is no doubt a fact; but that the honey dew is always derived from the insects, we cannot believe. Fields of rye, and other grain, are sometimes struck with the "honey dew," when no signs of insects can be discovered.

Several theories have formerly prevailed on this subject; but, so far as we are acquainted, the most generally received one at the present time is, that a peculiar state of the atmosphere occasions the bursting of the sap vessels of the plant, by which the sap is exuded to the outside of the stalk and leaf. The sap, then, becoming acrid, together with the derangement in the functions of the plant, is supposed to occasion the *blight* or *rust* in grain. And hence the prevalent idea that the honey dew always produces blight.

We are not prepared to vouch for the correctness of the bursting of sap vessels, &c. Our own opinion is, that the matter is not yet fully understood; and we would recommend continued investigation and observation, and have no doubt additional light will be obtained.

The communication of Rev. Mr. Abbot, in a late number of the New England Farmer, seems to support the theory mentioned by Dr. Jackson and Mr. Boyd. Mr. Abbot thinks that the wet and the warm weather pro-

duced an overflow of sap. He found the stalks and leaves of roots were burst open, and a gummy substance oozed out. He thinks a similar effect was produced on the potatoes, and that the disease which has affected them is similar to rust and blight in grain.

Since writing the above, we have met with the following explanation of *mildew* and *honey dew*, in a report of a lecture delivered by Mr. Heywood, before a farmers' club in England. The former he states to be caused by the rapid evaporation of water from the leaves of plants after a wet spring, when the salts the water contained were left on the surface of such plants as were already matured; while others, which were in a growing state, appropriated them to their uses; hence this effect on late Swedes, and on early ones. Honey dew was caused by an excess of carbon in the plant, which could only occur in dry weather, when the other ingredients could not be furnished for it to combine with.

No. 9—(7.)

For the Farmer and Mechanic.

AN ESSAY ON HONEY DEW.

From the Analectic Magazine, Philadelphia, 1815; *vol.* 5, *page* 54.

Mr. Fleet: Finding that a writer in the Cultivator refers the disease of the potato to the action of honey dew, I have been prompted to send you the following extract:

" My design in this essay is to give a brief statement of certain facts relative to the appearance of the honey dew in Carolina, which appear to militate against the received theories of its formation; together with a concise view of the opinions of ancient and modern writers with regard to this peculiar substance.

" The production of honey dew is influenced by the season of the year, evidently by the state of the atmosphere.

" In Carolina, it most frequently appears in the months of May or June, during a long absence of rain, and after a succession of warm days alternating with cool nights.

" Early in the morning it is found on the leaves of plants, grapes, &c., of the consistence of diluted honey, transparent, and resembling in taste the sirup of refined sugar; the viscidity of it increases with the heat of the sun; and abont ten or eleven o'clock it ceases to be fluid, giving to the leaves a shining and glossy appearance.

" Situations also appear to influence the production of the honey dew. I have observed it in the greatest abundance near the margins of stagnant marshes, ponds, and savannahs. In the district of Marion, South Carolina, is a morass, extending fifteen or sixteen miles in length, and one or two in breadth; it contains no trees of considerable magnitude, except the cypress and a few perennial shrubs, but abounds with annual succulent aquatic plants and grapes. Near the edge of this morass, during the season and state of the atmosphere alluded to, the honey dew is produced in such quantities as to moisten every shrub, and to cover the grass.

" Horses, which feed at large in the vicinity of the morass, may be found

at eight or nine o'clock in the morning with their manes and tails agglutinated to a mass with this substance. The particles of pine leaves and grapes carbonated by the fires which sometimes ravage extensive tracts of country in March and April, are frequently observed cemented with large masses, and in situations where, apparently, the honey dew could not have dropped from overshadowing trees. Swarms of bees inhabit almost every excavated tree; and from their honey, the poor inhabitants of this steril region derive no inconsiderable support."

Here follow some later quotations, from "Pliny" and others.

"Fenega, in his History of California, says that Father Piccola observes that in the months of April, May, and June, there falls with the dew a kind of manna, which becomes inspissated on the leaves of trees. He adds, that he tasted it, and, though not so white as sugar, it had all the sweetness of it. The good father, according to the common opinion, speaks as if the manna dropped from the sky."

The writer in the Cultivator says: "The disease was first indicated by a few small drops of honey dew on the stems of the potato plant."

It will be noticed that honey dew abounds in swampy places. In these places, the soluble mucous products of fermented organic matter also abound. In the absence of rain, are not these mucous products in a measure vaporized, and afterwards deposited as dew? If so, are we to be surprised at meeting the same phenomena in cultivated fields during a season of drought, when for a series of years we have been in the habit of manuring the fields with similar soluble mucous products? These products are contained in both fermented and unfermented barn-yard or stable manures. You will notice that the honey dew has been seen upon "the pine leaves and grapes, carbonated by the fires." Therefore, in that instance, it could not have been produced by insects, neither could it have fallen from overspreading foliage. There could have been no "bursting of sap vessels," since the leaves were dead. It must, therefore, in that instance at least, have been a honey dew: in other words, organic matter vaporized while in a mucous state, and deposited again as dew. I touch this point, since it appears like another attempt to prove poor Dame Nature guilty of producing for us rotten potatoes. When all the organic parts of the soil (excepting neutral salts) are brought into an insoluble state, and circumstances made favorable for their slow combustion, instead of their fermentation, we will then not be led to refer the disease of the potato to the presence of honey dew: and for this simple reason—honey dew cannot appear under such circumstances. Respectfully, F. MORTIMER BUTLER.

No. 9—(8.)

PELHAM FARM, ULSTER COUNTY,

December 18, 1844.

DEAR SIR: Your letter, requesting to be informed more fully respecting the rot in potatoes than is contained in the report made by Mr. A. B. Allen, editor of the "Agriculturist," (page 354,) of a conversation I had with him on the subject in November, was duly received.

In answer thereto, I would state, that I am fully convinced the decay throughout the country is caused *mainly* by insects; and I am led to this belief by the following experiments:

In the year 1843 I planted a field of several acres in drills, harrowed the ground level, and topdressed it with 200 bushels of oyster-shell lime and charcoal dust to the acre. The yield was 432 bushels per acre. At the same time, the potatoes throughout the *country* were more or less decayed; likewise, a parcel of the same seed, planted contiguous to the above, not limed, was also decayed.

This year (1844) I planted the same seed in the following manner: The ground was thrown into drills, and manured heavily with barn-yard manure. The potatoes were cut into single eyes 14 days before required for planting, and covered with plaster. Limed a few, for the sake of experiments specified. They were sprinkled with small white (almost imperceptible) insects, and were, consequently, rejected. Those limed were free. I planted them in the drills on the manure, 9 inches apart; tops, centres, and ends, separately, to mark the difference in growth, which was not very great. The first three drills (300 feet in length) were covered with dry charcoal dust.

No. 2.	Three drills	covered with	oyster-shell lime.
No. 3.	Do	do	bone dust.
No. 4.	Do	do	poudrette.
No. 5.	Do	do	unleached ashes.
No. 6.	Do	do	new-mown grass and plaster.
No. 7.	Do	do	fine salt.
No. 8.	Do	do	silicate of potash.
No. 9.	Do	do	guano.

And so on throughout the field, each alternate 3 drills with a different substance, except 6 drills, in which the same seed was planted without any composition except the barn-yard manure; and adjoining them, 6 drills planted with superior French potatoes, received three weeks before directly from Havre. The furrows were then all reversed by the plough, and the potatoes covered; after which, a heavy stick was drawn by a pair of horses across the furrows, to level them.

No. 1.	The potatoes	planted in	the first three drills came up first.
No. 6.	Do	do	with new-mown grass and plaster, second.
No. 8.	Do	do	with silicate of potash, third.
No. 9.	Do	do	with guano, fourth.
No. 3.	Do	do	with bone dust, fifth.
No. 4.	Do	do	with poudrette, sixth.
No. 7.	Do	do	with fine salt, seventh.
No. 5.	Do	do	with unleached ashes, eighth.
No. 2.	Do	do	with oyster-shell lime, ninth.

The 12 drills without composition came up later than any of the rest.

Cultivation.—When they were 4 inches above ground, the earth was ploughed from them. After an interval of six days, it was ploughed to them again; the field, being in perfect order, required no other attention during the season. On the 3d of October they were ploughed out, and proved to be perfectly sound, with the exception of the 12 drills of pink-eyed kidneys and French potatoes, without composition, which were entirely rotten. 600 bushels were pitted immediately, and not examined before the 5th of December, when they were found to be perfectly sound.

During the summer, I examined fields in Dutchess, Ulster, Albany, and Schenectady counties, and invariably found insects with numerous legs, and in some instances a small worm, not unlike the apple worm in form, but red, and very minute, ensconced within the withering vine. The con-

clusion I came to was, that these insects fed upon the albumen requisite to form the perfect tubers; and, consequently, when dry, it was either wholly decayed, from an excess having been abstracted, or, if apparently sound, so much had been taken as to produce decay by degrees; thus, after being stored, a sort of fungus appears upon the tubers, and the consequent decay is rapid. I leave you, sir, more learned in these matters, to decide whether the fungus is caused by insects or not.

I am, very respectfully, your obedient servant,

R. L. PELL.

Hon. H. L. ELLSWORTH.

No. 9—(9.)

Discussion in the New York Farmers' Club, November, 1844—*Potatoes, wool, &c.*

Dr. Gardner. I notice that the disease is referred to the action of a fungus. I have examined diseased potatoes; the disease seemingly originates in a fungus, the marks of which are peculiar. In examining an apparently sound potato, small elevations are to be seen near the eye. Gradually the skin opens, and a black fungus makes its appearance. The number of black fungi having this power of bursting the skin is very great; they are termed *cryptogamous.* Their first appearance is like a black wart, which then begins to spread itself, making an ulcerated surface. The black character soon leaves—the sporedia succeeds; these latter are of a white-ash color. The potatoes become spongy—often soft and putrefying. This different termination I consider as the same disease. In Germany a distinction is made; the one state is called dry rot, the other wet rot. The origin of this disease is a fungus; the remote origin is something else. Certain conditions are requisite for the growth of the sporea of the fungus. An unhealthy state in the plant promotes their growth. Plants in a healthy growing state are rarely attacked by fungus; probably, therefore, some change takes place in potatoes before the fungus begins. Farmers are the most singular class in the world; they do not make observations, or apply to scientific men, when their crops are assailed by an enemy. The reason that we know nothing about the potato disease is, because the farmers let them rot before acquainting scientific men with the presence of the disease. But I will state that this disease is an old one, having been long known in Germany and England. One of the most fertile causes of this disease is the habit of using farm-yard manures in a state of fermentation. Fungi of all kinds (except two or three) are continually produced from such manure. Should we adopt a new mode of preparing farm-yard manures, this disease would pass away. I refer to their preparation by *eremacausis,* (slow combustion.) Smut has no where been seen along the English sea coast, except where much farm-yard manure has been used. I would recommend that some of our farmers next year prepare manure with lime and earth by that process, without fermenting it. I appeal to Mr. Butler, who has had much experience in the preparation of manures in the dry way, and is present. I ask whether he has ever seen fungi on them?

Mr. Butler. Never, sir.

Dr. Gardner. Many bad potatoes are now pushed into market. To

guard our citizens against them, I recommend that none be bought without careful examination—especially such as are covered with mud or dust; wash several, and examine critically. If there are small swellings, (often not larger than a pin's head,) you may presume that they are the first symptoms. If you find the skin burst and thrown back, with a black spot appearing, you may be sure that disease is there. The dry rot often appears in a whitish surface. If the wet rot sets in, it is black and soft; worms are to be found in the putrefying parts.

Mr. Butler. I have been convinced that many of the diseases with which we are afflicted soon after the eating of succulent vegetation, (as green corn,) arise from the impure fluid substances taken up by plants from the earth. I determined to investigate the matter, and some years back tried the process of eremacausis in the manufacture of manure. Through this process, manures are brought to an insoluble state, but are still susceptible of further decomposition through eremacausis, or slow combustion, and consequently they become gradually converted into gases and water. Thus the plants are principally fed upon gases, in place of fluid organic matters. I found that both potatoes and corn grow soft and unhealthy when manured with ordinary barn-yard manure, but that they grow uniformly dry and mealy with lime prepared manure, or with manure manufactured by the process of eremacausis. The club will remember my previous communications on the preparation of manures after this process, when I call to mind "dry-rotted manures"—since such is the practical name by which this process has been presented to them.

Dr. Gardner. Many diseased potatoes have been brought from Germany, for seed, to the United States. Mr. Anderson has tried lime, broadcast; his crop is good.

Mr. Butler. When lime is used upon land direct, some time should be allowed for its action upon the organic matters therein, before the crop be put in. I present a communication on the disease of the potato. [Referred to the publishing committee.]

Mr. Wakeman presented a communication from Mr. G. A. Scherff. It relates to the disease of potatoes. [Referred to the publication committee.]

Mr. Carter. Barn-yard manure that retains moisture is not good for potatoes. It should be well decomposed. Potatoes may be growing in the field and flourishing to-day, and become diseased to morrow, if wet weather set in. One diseased potato may, through its dampness, communicate decay to an entire heap. But, if the potatoes be mixed with mould, the disease will not communicate. I would recommend, in keeping potatoes, that they be mixed with ashes, or with the dust of coal yards.

Dr. Field. The disease has not affected my early crop. Similar potatoes planted late have turned out almost a perfect failure. I think, therefore, that the failure is owing to the dry season. My late crop grew well until the dry weather came on. Mr. Bridgman thinks that the disease is owing to hot, dry seasons. In such seasons, the leaves cannot assimilate the food. The plant is thus brought into a diseased state, and the root is disposed to decay, from a want of nourishment; even after the drought, rain does no good, but rather injury, by hastening decay. There are crops which will not grow as well in a wet season—as corn; turnips in a hot season. The stimulating properties of manure hasten disease. We always observe a difference on the same field in the crop; some are more liable to rot than others. Early crops were good, owing to the variety; early varie-

ties failed, while late varieties were perfected, because the dry weather did not affect them. New lands are the safest, because they retain a proper condition of moisture. My potatoes upon wet lands are destroyed, owing to a want of under drainage. Lime has been used upon all of my lands. The lime was drawn on my low land last fall. A compost of muck and lime was put upon my high land. Hot manure has a tendency to hasten the decay of potatoes.

Mr. Cook. I recommend new seed. Last year I purchased black potatoes. My potatoes are sound. Farmers near me have rotten potatoes.

Dr. Butler. Have I not been previously informed that you used muck treated with ashes upon this land?

Mr. Cook. Yes, sir, that is the manure I used.

No. 9—(10.)

THE POTATO ROT.

Communicated to the Farmers' Club, November 19, 1844, by F. Mortimer Butler.

The potato rot being under discussion, permit me to offer a few remarks on the subject. We are informed, by Mr. Wignall and others, that new uplands give sound potatoes. By new land, as explained, we understand virgin soil—the mixture of vegetable mould and earth. With the character of such soil we are familiar; it is loose and mellow. The vegetable mould, one of its main constituents, and to which it owes its mellowness, is insoluble in water, strongly resists fermentation, but readily yields to slow combustion. From such facts we are enabled to read the result. The mould of the upland virgin soil favors the infiltration and evaporation of superabundant moisture; the soil is soon brought into proper condition; slow combustion sets in, and through it the mould is gradually converted into gaseous bodies and the vapor of water. Thus, plants growing in virgin soil are fed mainly upon gases, water, and saline bodies; the crop proves healthy and firm. Exceptions are to be found in undulating places; where the soil is a retentive one, incipient fermentation occurs, instead of slow combustion. Mr. Carter has presented to the club a system which, in his experience, and that of others, has proved a successful one in the cultivation of the potato. This system provides the removal of superabundant water, and consequently favors the slow combustion of the organic matter previously contained in the land. Exceptions may occur; but, by correcting in the first place the manures made use of, these exceptions will cease. Bring the manure to that crumbly state, wherein, like vegetable mould, it shall be insoluble, but susceptible of slow combustion.

By Mr. Blakesley we are informed that lime in the hill has been tried upon old land, and the crop proved to be much rotted. In this instance, as I have been personally informed by Mr. B., the lime was put immediately upon the seed potato. In the presence of caustic lime, plants will to a certain degree be deprived of one of their main constituents—oxygen. Had perfectly mild lime been used, the result would have been far different. By the president we are informed that lime, together with manure, had been spread upon a garden the previous year; the garden was then tilled, and this last season planted with potatoes. The crop proved good. Hydrate of lime combines with soluble vegetable and animal substances,

forming compounds, which, upon drying, or being acted upon by atmospheric air, become insoluble in water. Gradually these compounds separate, the lime becomes a carbonate, and the organic matter becomes mould. In the successful experiment of the president, it will be seen that the lime, under the circumstances in which it was placed, had ample time, before the potato crop was put in, to convert the organic matter there present into mould, and for itself to become mild, by passing into a carbonate. Mellowness of soil is thus produced. The effect upon the crop corresponds with that of nature in the virgin soil, as given by Mr. Wignall, and with the practice of Mr. Carter. The ultimate end is identical—being the insolubility of the organic matter, and its slow combustion. Mr. Minor presents poudrette and sound potatoes. In the manufacture of poudrette, the soluble night soil is principally converted into an insoluble inodorous powder, similar in mechanical properties to mould. Its soluble portions are neutral salts; these are stimulating, while the insoluble portions suffer slow combustion, and become food for the plants. There can be no doubt of the good effect of poudrette, provided thorough tillage, with drainage, as recommended by Mr. Carter, be first attended to. Fungus and insects have been offered as a cause. There is yet a remote cause favoring the growth of fungus and life of insects. This remote cause is overcome by proper drainage, tillage, and change of character in the manure. It pleases me to realize that the mind of the farmer is about being awakened. Simple decay has too long been confounded with fermentation. For many years I have tried to call the attention of farmers to the difference in the nature of decompositions occurring in the forest and the swamp. To meet the mind of the farmer, I called the decomposition occurring in the forest, "dry rot;" that taking place in the swamp, "fermentation." Professor Liebig has appeared in the field; the decomposition occurring in the forest now stands as "decay," or "eremacausis." This latter term, compounded from the Greek, when translated into simple English, is "slow combustion." The action is the same as that to which I have referred as "dry rot." When our farmers realize the difference between slow combustion and fermentation, and follow the light embraced therein, we will not be troubled with diseased potatoes.

A Welsh paper says: "We have not had so good a harvest for years. Our wheat this harvest reaches 64 pounds a bushel, which we believe is about the average weight in Essex and the best wheat-growing counties in England."

No. 9—(11.)

From the New York Farmer and Mechanic.

POTATO ROT.

By G. A. Scherpf.—Communicated to the New York Farmers' Club, November 19, 1844, *by H. Meigs, Esq., secretary to the Farmers' Club.*

The circumstances occurring in agriculture are so varying, that it is often hard to come at the true causes of effects, which show themselves in very different ways and degrees. Yet, through all the observations made yesterday at the club, and the experience related, one grand line could be followed, which points to the same cause to which the disease was ascribed in Germany, where it prevailed some six or seven years ago. This grand

cause is the use (or perhaps abuse) of animal manure not sufficiently decomposed—a proceeding which, in Germany, nobody would think of. There, the old practice was to plant potatoes in ground which had been manured the year before, and first bore a crop of grain, or plants of the cabbage tribe. It is true, the quantity obtained is far less than here; but the quality is a different thing. From German publications that sometimes fall into my hands, I have learned that the same disease has been prevailing there, and the cause has been ascertained to be the adoption of the new practice of manuring the ground with animal manure simultaneously with the planting of the potatoes. The disease disappeared as soon as this practice was dropped.

Comparing the observations related yesterday in your meeting, this conclusion seems to be the true one.

General Tallmadge stated that he got good potatoes with manure in well-limed land; but we know how powerfully decomposing lime acts upon animal matter, and attracts free ammonia. Mr. Minor stated that potatoes manured with poudrette were sound; but poudrette, although a high animal manure, contains no free ammonia, and very little ammoniacal salts, and is (at least in France) treated with lime. Several others stated that potatoes they had planted in new ground, without manure, were sound. The Sun newspaper, a few weeks ago, related that a farmer in Vermont states that his potatoes were all rotten where the field was covered with barn-yard manure, and sound where muck had been used. Taking hold of these facts, we may drop all minor variations of observations, such as variety of potato, appearance of the stalk and leaves, insects, &c.

It is too well understood, that if any plant does not find in the soil a sufficiency of its constituents, it will be found wanting. A ground without sulphates and phosphates will bring but poor wheat grain. And if there is in the ground a superfluity of constituents not congenial to the plants growing on it, may they not be injured by them? By whatever symptom this injury will become obvious, the first cause may be the same, and the symptoms may be so influenced by diverse circumstances. The common observer will easily get confused, and not be able to come to exact conclusions. I have seen it stated that some optician had subjected the diseased part to a powerful microscope, and discovered animalculæ therein, and ascribed to them the defect. Poor observers! they take the effect for the cause, forgetting that all putrefaction of animal or vegetable matters must create infusory animalculæ.

Those who believe the disease an imported one are mistaken, I am fully convinced. Last year I consumed only Irish, English, or French potatoes, and never could find a trace of this disease in them. This moment I can show potatoes planted from the same Irish or French seed; and a minute examination will discover small traces of the disease, but so little as to escape notice very easily. But let them be propagated for some years more, and they will be more penetrated by it.

Another circumstance is, that it seems to be certain that the (so called) Mercer potatoes are the most injured by it; and, at all events, whenever there were potatoes brought from Europe, this variety has not been imported; it being not in favor, and scarcely known in Europe. Every body knows that sound potatoes here have at all times contained many tubers with a small cavity in their centre; the pulp immediately round it being thin, always of a very watery consistence, often of a globular shape, de-

taching easily from the better outer part of the potato. This is like a disease which I have found in potatoes here these twelve years, whilst I cannot recollect but very rare instances of it in Germany. For twenty-five years I ate potatoes there, where it is quite a curiosity when it occurs; and which disease I had not in the potatoes which I planted, without manure, in Jersey and on Long Island, in sandy land.

I will close with the expression of my full belief that American farmers will not have good or sound potatoes, unless they drop their practice of planting them in a heap of manure, of which all root crops are not fond. The same experience has recently been made in Germany, and equally in France, in the planting of sugar beets. Richly manuring the ground gave large crops; but the sugar manufacturer found that he had to work up a large quantity of pulp, in which there was no more saccharine matter than in half the quantity of small beets planted in unmanured ground. What in the beet is sugar, is in the potato starch, viz: the fecula; of which a small, regularly shaped potato, planted in dry sand and vegetable soil, contains as much as a big blown-up lump, with half a dozen excrescences, grown in a heap of putrescent manure.

No. 9—(12.)

From the New England Farmer, November 20, 1844.

THE DISEASE IN POTATOES.

The alarming progress which the destructive epidemic or disease in the potato has made in New England, has naturally excited much inquiry into its cause, and what is likely to prove a remedy for it. We can hardly look into a newspaper, but we see some new theory advanced. The remarks and observations of the various speculators upon the matter are so vague and contradictory, that darkness, rather than light, is thrown upon this perplexing subject. Mr. Henry Paine, of Oxford, in a communication to the Massachusetts Cataract, says: "He examined the diseased potatoes with a microscope that magnified a thousand times. He found no insects in the roots themselves; but in the diseased stalk, near the junction with the roots, he discovered an insect of a dark brown color, having a body shaped like the soldier ant, with legs like the hairy garden spider. On the body were two projecting sockets, plainly indicating that the insect had, at some time, belonged to the winged tribe." It is not in our power to insert a cut of the insect, which is given in the communication. A scientific friend assures us that it is evidently the common *aphis*, or plant louse, frequently found on the stalk of the potato, (particularly when in an unhealthy state,) and which often creeps down to the root; that this cannot have any thing to do with the disease, as it has been known by him on the potato vine for the last thirty years.

We have been much interested with Mr. Teschemacher's views on the subject, and sincerely hope he will succeed in ascertaining the true character of the disease, and in discovering a remedy which will prove effectual. If salt (as he supposes) will prevent it, it is of easy application and small expense, and at the same time beneficial to the soil.

Mr. Teschemacher desires us to add to his communication in the last week's Farmer, that "the worm in the diseased potato is the same as that which breeds in the mushroom and other fungi, which family is its natural

food;" also, that the fungus *erysibe* of Dr. Wallroth is the same as the *uredo* of other writers, and what is commonly called *rust*.

Our friend Dr. Dana, of Lowell, has received from Rev. Mr. Abbot, of Westford, a communication on the potato malady, which was kindly forwarded to Mr. Teschemacher, for publication in the New England Farmer.

"Lowell, *November* 14, 1844.

"Dear Sir: The New England Farmer of this week, and this letter, came to me at the same time. I send it to you, hoping that the facts may assist you in your researches into the cause of the potato malady. My friend, Rev. Mr. Abbot, is a sound, philosophical, and practical farmer. He received a premium from the agricultural society for his improvement of the 'cove' referred to in his letter. If you think the facts and theory may help to elucidate this matter, please hand this to our friend Breck, for his paper. For myself, I have not yet formed an opinion. I want light. I look upon it as a matter whose causes and cure are to be determined by such experiments as you are now pursuing; and perhaps we shall, after all, have to call it an epidemic, of whose causes we shall be as ignorant as of those affecting the human race.

"With regard, very truly yours,

"SAML. L. DANA.

"Mr. Teschemacher."

"Westford, *November* 11, 1844.

"Dear Sir: My theory is, that the disease in the potato is similar to the blight or rust in grain—that is, that it is caused in much the same way. My reasons for this opinion are the following: I think two causes conspire to produce rust in grain, which I will endeavor to illustrate by a fact. When I was endeavoring to bring my cove meadow into a productive state, I sowed that part of it which is entirely surrounded by a ditch with oats and grass seed, intending to mow the oats for fodder. The season was warm and dry—so dry that corn was seriously injured by the drought; yet, when the oats headed out, they looked so well that I determined to let them ripen; but just when the grain was beginning to fill, there came a great rain, and, in one or two days afterwards, I looked on them, and found the stalks and leaves were cracked open, and a gummy substance issuing out of every fissure. This appearance convinced me that I should have no grain if I let them stand, and I had them immediately mowed for fodder. Was there not a chemical action going on in the earth, during the long time of warm dry weather, by which food for plants was elaborated, and remained undissolved till the rain prepared it for the plants in such abundance that they could not contain it, and consequently burst, and let the fluid (which, had there been no rupture, would have filled the grain) issue out at the fissures?

"The state of the weather the past season has, I think, been rather peculiar. We had several small showers and light rains, which kept the top of the ground so moist that plants at no time exhibited the appearance that they do in a severe drought. There was but one rain after potatoes were planted, and before the blight, which wetted the ground to any considerable depth; and it is probable that even that rain did not reach the roots so as materially to affect them. For some time previous to the blight, the ground

was dry, and the weather very warm for the season. Yet the vines of my potatoes remained green, and apparently healthy and growing, till the great rain came; and then, in two or three days, the leaves withered, turned red, and died. The weather continued so warm, that no one believed that they had been injured by frost. That the potatoes were injured about the time of the rain, I believe all admit; and that the cause of the injury was what I have suggested, I infer from several facts. My potatoes were planted on an old pasture, which I had ploughed to free it from bushes which infested some parts of it. The land was very stony, and the labor of digging and removing the stones made it late before I could plough and plant it. I had but little manure to put on it, and, contrary to my usual practice, I determined to put what I had in the hills. The greater part of the field was manured with a poor compost made of mud mixed with a very little dung from my barn cellar; a small part was manured with chip dung taken from the door yard.

"Where these manures were used, the potatoes were nearly all sound, except in a valley which had received the wash from the road, and had, from that cause, become richer than the greater part of the field. More than a tenth part of the potatoes raised in this valley were injured, more or less, by the rot. I manured part of several rows with dung taken from the barn cellar, and applied it in its full strength. The vines where this manure was used were very large, but the greater part of the potatoes were rotten; and the facts were the same on a place where compost had been prepared for several years.

"May we not infer, from the facts above stated, that the great rain which preceded the blight in the potato vines caused a flow or pressure of sap in the vines which they could not sustain, and consequently could not properly elaborate the fluid which descended from them to the tubers, and that this imperfectly prepared fluid corrupted the potatoes? If my theory be correct, we should expect the malady to be greatest in just such instances as it was greatest in my field. Some kinds of potatoes may be able, from their different constitutions, to bear a surfeit better than others, and all kinds may bear it better in some stages of their growth than in others. I have not heard that potatoes which had completed their growth, or nearly completed it, before the rain, were injured.

"EPHRAIM ABBOT.

"Dr. Saml. L. Dana."

No. 9—(13.)

For the Boston Cultivator.

DISEASE AMONG POTATOES.

Messrs. Editors: Of the fact that a disease has raged among potatoes this fall, too many of your readers are undoubtedly well aware, from the ravages it has made in their own fields. The effects of the disorder are visible wherever it exists, which I believe is very general over a large section of country; and the actual *loss* which must result from its prevalence must be great. As yet, the papers have said very little upon the subject of this disease, which, in Berkshire, is a new as well as a most unwelcome visiter. Yet the subject is one of a magnitude which calls for an investi-

gation from every individual; and the result of these investigations should, in some way or other, be brought before the public mind; so that (it may be) a preventive of its recurrence, or a remedy for its progress, in its daily stages, may be found. Under these impressions, we have concluded to offer the result of our own observations, sustained by that of many of our neighbors, as to the how and wherefore of this new comer.

The first thing, perhaps, which should be brought into notice, is the season as it has passed with us. Early in May, we had an unusual quantity of rain, so that planting was much retarded; yet, in consequence of the favorable character of April for getting in crops, the labors of the season were in advance of what they are most years; so that, notwithstanding the *heavy rains*, corn and potatoes were planted as early, and earlier than in most seasons. Those rains were heavy, and calculated to leave clayey lands in a compact condition. After they subsided, and about the time for potatoes to set, there was rather a deficiency of rain, insomuch that the grass crop, to some extent, felt its effects; consequently, potatoes did not, as a general thing, (so far as we have been informed,) set for more than half a usual crop. Then again came on the rains, and a great deal of *cloudy weather*, which continued until the last of August.

Thus much for the season. Next, the disease; which evidently and conclusively, as we think, has its origin in the stalk. How it is planted there, is a matter on which various opinions exist. Some are confident that it arises from the depredations of a black bug or fly, from feeding upon the leaf until it is nearly consumed. This opinion, however, we think must be erroneous, from the following facts, viz: the black insect alluded to is no new visiter among us; therefore, if it was going to destroy the potatoes, it would have done it years ago. Then, again, many fields exhibit but faint vestiges of its operations on the leaves. We have seen, in potato fields where the rot has extensively prevailed, the leaves dried as perfect, in all their parts, as potato leaves ever were. And, finally, the disease appears to have its origin on the stalk, where it sometimes first develops itself by presenting a very small surface, which continues to extend until it has spread around the stalk, so as to stop the circulation of sap before the leaves dry up, while at the same time it extends itself upward and downward. The appearance of this spot resembles that of a frost-bitten potato vine in November; while, perhaps, the stalk below it exhibits various appearances, from those first induced by the disease, to (as you approach the ground) an almost healthy greenness.

These observations have induced us to suppose that the disorder is a rust, produced in a manner similar to that by which the rust on wheat or rye straw originates—a bursting of sap vessels, from a superabundant flowing of sap. It appears evident that the disease which produces the rot originates in the stalk, from the fact that it appears there while yet the tuber has no mark of the disease upon it. When it does reach the potatoes, it develops itself in small spots, similar in color to those which appeared on the stalk; and most usually seats itself among the eyes, from which the shoots of a new crop would originate. Its appearance very closely resembles that of a slight burn on the human flesh; and, by slight friction, the skin of the potato will rub off like the skin from a burn, and a watery substance exude, as in the latter case. From this stage, its progress may be watched until it has spread over and through the potato; and rotting, with a very nauseous odor, follows. When a potato first exhibits appearances

of the disease, there is no remedy, unless the part affected is entirely cut out; and, it may be, not then—rot it must, and rot it will.

Now, we will suggest a query, without venturing an opinion. Our object is rather to elicit information on this subject, than to make a vain show of wisdom. Is not the disease originated in the tuber in consequence of the circulation of sap being cut off in the stalk, so that it cannot be elaborated in the usual manner in the leaves; and by its being obliged to return in its unmanufactured state, impregnated, it may be, by disease in the stalk, which it conveys by inoculation to the *tuber?* Then another query may arise. Why are not all potatoes in the same hill affected in the same way? This may be owing to various causes. A potato may have become so nearly detached from the vine (which is the case with all potatoes at full maturity) as to have that circumstance operate as a preventive; or there may be other ways, of which we have no knowledge. But we go one step further: If the theory we have hinted at be correct, (and we hope to see the subject fairly examined,) the first operation to be performed on the disease seizing the stalk, as it appears to us, should be to cut off, either by pulling or mowing the vines, all communication between them and the tuber. Both experiments have been tried among us this season; but we fear the work of rottenness, in both cases, had so far advanced as not to admit of a fair trial. It was certainly so with regard to pulling, so far as we have heard—owing, probably, to the fact that it was a new disease—and the farmers did not know what to do, and therefore neglected doing any thing until its ravages were too far advanced to be stayed. Some dug their potatoes, but that was of little avail. Those that were going to rot, would rot in spite of them; and when placed in proximity with their neighbors, they are very apt to communicate the disease to them—upon the principle that misery loves company, we suppose. It has generally been concluded, hereabouts, that the better way is to let them remain in the hill until the usual time of digging; and if they will rot, rot there. We think, however, that this part of the story is told for the present season; for, in digging, a few days since, for feeding, we discovered no new cases—they were either very sound or very rotten. The disease first appeared in this region early in August, and its locality was in a lowland field, very near a swamp. The last green potato vine we saw was in September, (about the 10th,) on a light dry field. It has been remarked, that those planted on dry sandy soils have suffered much less than those in other localities. No variety has been exempt from the attack. The disease showed itself first on the new and more esteemed varieties; and the orange (which is a valuable potato for all seasons, if properly cooked) and flesh-colored, were the last smitten.

But we have already occupied more space than we designed at the beginning. We therefore drop this topic, in hope of hearing much from others, and some time being able to say more ourselves.

Yours, truly,

W. BACON.

RICHMOND, (MASS.,) *September* 27.

No. 9—(14.)

From the Boston Cultivator.

Agricultural meeting at the State House, January 7, 1845.

After the meeting was organized, the disease in potatoes was discussed.

Mr. ALLEN, of Plymouth, spoke of the great evil—its alarming effects, and the importance of investigating the subject and finding a remedy, if possible. He stated that a gentleman, noted for his scientific attainments, had suggested that salt might be a remedy, and he recommended experiments with salt.

Mr. ALLEN, of Northfield, remarked that he was in Canada last season, on the St. Lawrence, and this disease did not prevail there; and he did not discover it till he arrived within 70 miles of Bangor.

Mr. STONE, of the Senate, said it would be well to know what kinds of potatoes were affected. In Worcester county, the Nova Scotia potato, or "peach bloom," was the only kind that had escaped. He recommended the appointment of a scientific committee to investigate the subject.

Mr. ALLEN, of Plymouth, said it had been stated that animals and human beings had been destroyed by eating diseased potatoes; and, as there was much alarm on that account, it would be well to investigate the subject in this bearing.

Mr. J. M. EARLE, of Worcester, said that he had examined into this disease before the papers said any thing on the subject. He believed that it had been much longer in the country than was generally supposed, and that it had been gradually extending. For three years it had been extending in New York. In Pennsylvania, it prevailed the most in mountainous regions. A friend of his used about half a spoonful of salt to a hill of potatoes, when they began to set, to prevent injury from worms; and they were excellent where the salt was used, the others were not worth harvesting.

The PRESIDENT stated that he ploughed part of a field last fall; on the other part he spread manure in the spring, and turned it under. On both parts he put compost in the hill, and all were affected alike with the disease; not one-fifth were sound. Chenangos, that were planted early, were free from disease.

Mr. EARLE named two cases in which cattle had been fed freely on diseased potatoes without any injury; and another, of a hog that was fed liberally on them, and he did well.

Second agricultural meeting at the State House, January 19, 1845. *Subject: the potato disease.*

Hon. LEVI LINCOLN in the chair.

Mr. TESCHEMACHER, of Boston, opened the discussion. He first read from a pamphlet, published in Germany a few years ago, on this disease, which prevailed there to an alarming extent. There were many conjectures as to the cause of the disease, such as the manure, soil, &c. Where the seed was cut, the injury was greater—an affection of the tuber commencing at the cut part. He had made numerous examinations on diseased potatoes. The smell was like decayed *fungus*, and he was inclined to the opinion that this

was the cause of the disease. Fungi are very fine particles of vegetable matter that float about in the atmosphere, imperceptible to the naked eye. He had examined many potatoes with a view to learn the cause of this disease. He inspected some potatoes in which the disease had just commenced. On cutting them open lengthwise, he discovered small white worms, about one-fourth of an inch from the skin. At that stage the disease had not affected the starch. From the depositions of these worms, the cells became thickened, which gave to the potato its peculiar appearance in this disease. He tried to propagate the disorder by placing diseased halves of potatoes in contact with other halves that were sound. In five or six days no effect was produced; but in two weeks the sound parts had become contaminated, and in six weeks they had decayed.

Mr. Buckminster, of the Ploughman, remarked that we had in September, about two weeks hotter weather than had been before for fifty years; and this might, in part, be the cause of the disease. As it was more common when manure was in the hill, it shows that heat is a cause, as heat is produced by the fermentation of the manure.

Mr. A. W. Dodge, of Hamilton, said that he had one kind of potato—the blue—four-fifths of which were diseased. He had raised these on his place for several years, and they had not been affected before. He had furnished some of his neighbors with the same seed, and their crops were not injured. He planted Chenangos, and they were cut, but not affected with this disease. The disease could not be owing to heat, as long reds were never better. He was feeding swine with his diseased potatoes, and they had not been injured. It was not owing to the seed running out, for the long reds had been long among us. As salt prevents smut in wheat, and as potatoes have not been so much affected on the seaboard, where sea weed and salt manures are used, salt may be a preventive.

Mr. Abel Gleason, of Wayland, planted three or four acres of potatoes on greensward; some were rotten. He gave one or two bushels to nine hogs, and they ate them. Next morning, one could not rise. He gave her half a pound of salts in new milk, and in four hours she was well. He manured in the hill. A neighbor planted potatoes adjoining him, (only a fence between.) and manured in the hill, and he had not one rotten one. The "veto" potatoes rotted most. He thinks the kind of manure had some effect, for where he used peat manure the disease was lost.

Mr. Peter Fay, of Southborough, observed that the first he heard of the disease was in the first week in September. His vines were then green; but soon they were diseased, and in 48 hours the tubers were affected also. The disease commenced at the top, and proceeded downward. Before the vines were affected, there was no disease in the potato. The malady was worse on old ground and on low land. He had three varieties. The blues were most affected, the vetoes next, and the long reds were scarcely any injured. He fed to stock those that were the most affected; so did others in the town, and no damage was done.

Mr. Page, of New Bedford, inquired of Mr. Fay whether, in any case, the potatoes were affected, unless the tops were diseased; to which Mr. Fay replied in the negative.

A gentleman from Chester said that the vines seemed struck with a sudden blast. He supposed that it was occasioned by atmospheric influence.

Mr. Prince Brackett, of Sturbridge, inquired whether potatoes planted early or late were most affected. Some of his neighbors planted early

on dry soil, and their crops were good. There was no blast on the vines. This disease produced a sudden effect. The leaves on all wilted in a single day, and soon the potatoes were rotten.

A gentleman from Connecticut said that the early planted were not much affected.

Hon. Mr. Allen, from Plymouth county, said that he would give the experience of a man in his county. He planted a field of potatoes—a part descending to the south, and a part to the north; both parts treated alike; and that part having the southern exposure was much affected, and the other part was not injured. Great heat may have some effect, as the most injury was done where the heat was greatest. In some parts, the long reds were not affected; but in Plymouth county some say that this variety was most affected. The Abingdon blues seem to have sustained the most injury. He thought the best seed was from the late planted, and farmers should plant some late for that purpose.

Friend J. M. Earle, of Worcester, remarked, that he travelled considerably last fall, and he made many inquiries as to this disease, and examined diseased potatoes in many places; and all seemed to agree that those planted early generally escaped. Chenangos were much affected. He did not think that great heat occasioned the disease; for we often have greater heat in July and August, to which early potatoes are exposed, than at a later period in the season; of course, the early planted are exposed to the most heat. The disease was considerably developed before the warm weather in September. In some cases, part of a field of potatoes was killed, while the rest escaped.

Hon. Mr. Dillingham, of the Senate, said he thought that salt would have no good effect. He planted an acre, using sea weed, kelp, and barn manure. The potatoes were all dry at the same time, and appeared good. They were put in the cellar. In three or four weeks, on boiling them, it was found that the long reds were much affected, and turned black under the skin. They were all overhauled, and the long reds were much diseased, and the Rohans about the same; but the Chenangos were not injured The principal part of the sea weed and kelp were on the part planted with long reds.

Mr. Cole, of the Cultivator, stated that, after all that had been said, we had not discovered the cause of this disease. What appeared to be a cause in one case, had no effect in another. He had for some time thought that it was occasioned by atmospheric influence, which could not be explained, as he stated at the previous meeting, in the same manner as diseases which affect mankind and animals. Some persons are predisposed to disease, and are affected, while others escape. So some varieties of potatoes are hardy, and escape this disease; while others are tender, and predisposed to it. This is not owing to old varieties. The Deane potato (called also the veto and Abingdon blues) is more affected, generally, than the long reds, which have for a long time been among us; while the veto has been more recently from the seed. The reason that early planted potatoes were less affected is, because this blight prevailed late in the season. Many things assigned as causes are only predisposing causes He had found, from experience, that potatoes planted late were best for seed, and grew the most vigorously. It is important to find preventives of the disease, though probably no complete remedy will be found. Hardy varieties should be preferred; seed, for late planting, if not affected, will be best. Plaster may be useful. Mr.

Everett stated the other evening that the injury was least when plaster was used. A Mr. Netterville, of New Jersey, found that his potatoes were affected, in 1843, after being put into the cellar; and so he picked out those that were affected, and put half a peck of slaked lime to each layer of the others, and they kept well. On planting, last spring, he put a table spoonful of lime in each hill; and after they were up, and before hoeing, he applied to each hill about a gill of a mixture—of lime 2 bushels, plaster 3, and ashes 8. He had not one rotten potato in the fall, while those of his neighbors were much diseased. Although lime may not be a complete remedy, it may have a favorable effect.

Mr. Thomas Kempton, of New Bedford, observed, that seedling potatoes had been equally affected with others; that the disease commenced at the stalk, and progressed up; that late planted had been most injured.

Hon. Mr. Foote, of Berkshire county, said that William Partridge, of New York city, well known as a good practical chemist, in preparing a piece of sandy land on Long Island for potatoes, mixed with the surface soil a large portion of pulverized charcoal, and he had a good crop.

The President remarked, that the whole discussion reminded him of the remark of an old physician, who was on consultation in a case of spotted fever; and, having examined into the case, and his opinion being required, said, "It is *death*." So, from all that has been said on this subject, it only appears that it is *death* to the *potato*.

No. 9—(15.)

ON THE DISEASE IN THE POTATO CROP.

In the periodical works of agricultural literature, the attention of the reader has been particularly directed, of late, to the subject of dry rot in potatoes. The great loss of produce in harvest occasioned by this disease makes it necessary, for the future, that great care should be taken in the management of this vegetable, now of such great importance, on account of our rapidly increasing population.

Naturalists, who have been called upon for advice upon this subject, seem to differ as to the cause of the disease. Some of them affirm it to be a species of fly; others attribute it to small fungi, or parasitical plants, which occasion the scab and corruption of the potato.

Dr. Sprengel tries to prove that the protoxide of iron present in the soil, being rendered soluble by the ammonia of the manures, (particularly of sheep's dung,) exercises a great influence upon the putrefaction of the potato. Setting out with this theory, he considers the different effects of marls, in the cultivation of the potato plant, to be dependent on the greater or less proportion of protoxide of iron which they contain. He thinks it probable that the bad effects of the marls which contain protoxide of iron upon the potato may be prevented, by exposing them for a considerable period to the action of the air, by which means the protoxide is converted into peroxide of iron.

Many also believe that the constant cultivation of the potato from the root has weakened the vital energies of the plant, and try to account for the disease, and consequent failure of the potato crop, in this way.

In the 2d part of volume 4th of *Der Allgemeinen Landwirthschaftlichen Monathscrift*, published by Dr. Sprengel, is given an outline, shown in the following valuable remarks and suggestions proposed by the celebrated M. Standinger, of Gros Flotbeck, near Hamburg.

The cultivation of the potato is one of the principal objects of farming in the vicinity of Hamburg, owing to their use for particular economical purposes, the growing of corn being only a secondary consideration.

This is particularly the case in Flotbeek, where the cultivation of the potato has been practised on a large scale, ever since its introduction by the late Baron Von Voght, in 1786. Though M. Standinger has resided there ever since 1793, and has been engaged partly as a land steward, and partly as a tenant, and has been constantly mingling with practical men, there can be no doubt but that he has had great opportunity of experience in all relating to the potato culture. In all this long course of practice, however, he has never witnessed any thing like the disease described by the author of the paper in the previously mentioned part of *Der Allgemeinen Landwirthschaftlichen Monathscrift*. It certainly has happened several times in Flotbeek, that when the potatoes, in wet weather, have been laid too close, and mixed with too much earth, they have become infected with disease in the interior of the bulb, and have putrefied; and even when the potatoes which had not suffered from this putrefactive process were planted out, not half of them germinated; and those which did shoot, had but a sickly growth, and gave a poor crop. This, however, was not caused by disease, but arose from too much heat in the potato heaps or pits, which occasioned fermentation in the potato, just as is the case when corn lies too thick, and heats.

From the marks given by the author of the paper alluded to, viz: that blue spots can be plainly distinguished when the potatoes are cut through, it is evident that a stagnation of vital action has taken place in the interior of the potatoes, which increases when they are kept, and which eventually is the cause of the sickly growth of the young plant.

From these facts, it is plain that, in the opinion of the author, the newly planted potato has within itself the seeds of the dry rot. The natural conclusion from all this is, that such potatoes should neither be cultivated for seed nor for planting out. But, as whole districts are occasionally infested with this disease, it is difficult, and sometimes impossible, to obtain perfectly sound potatoes for planting. For this reason, the author, in the *Hamburg Correspondenten*, recommends the raising of potatoes from the seed apples, by a simple method; by which, even in the first year, large and useful potatoes may be obtained. The author, in the *Allgemeinen Landwirthschaftlichen Monathscrift*, seems, however, to doubt this mode of raising from the seed apples; and, in confirmation of his opinion, refers to an experiment, by which he found that potatoes which were raised from seed three years before had suffered from the same disease. As many may now be afraid to cultivate the potato from the seed apples as a means of preventing disease, the author believes he has not begun a useless work, when he undertakes a more minute examination of the previously mentioned *outline of the disease of potatoes.*

The author of the outline just mentioned supposes this disease to arise from two causes. He considers the principal reason to be a small fly, very much resembling the insect called the "vinegar fly," and which the celebrated philosopher, *Ehrenberg*, has declared to be a species of *sciara.*

Further, he thinks that the disease is decidedly infectious, because in ten different kinds which he had procured from Berlin, and planted in a field in which Gibraltar potatoes, which had suffered from the disease, had been previously grown, all of them, with the exception of the Dutch sugar potato, became infected; from which he concludes that the diseased Gibraltar potatoes had infected those from Berlin, which the author presumed were previously in a sound state.

With respect to this hypothesis, that the before-mentioned flies were the cause of the disease, and the necessity there exists for their extirpation, he writes as follows:

"He found that five weeks after he had harvested a crop from a field planted with diseased potatoes, they began to undergo a dry corruption; and that even if externally they had a sound appearance, they had internally a number of the blue spot called stagnation spots, which, when the potatoes were boiled, remained hard,* were rejected by cattle, and which could not be used for the manufacturing of brandy; as, besides being unsuited for the purpose, the potatoes would not go through the crushing mill. In these potatoes he noticed white maggots with black heads. He now enclosed some of these potatoes in a large perfectly closed glass vessel, and saw, to his astonishment, that, after four or five days, maggots and flies would be distinctly detected inside the vessel. The latter were of the size of the vinegar fly, and had a greenish color and long wings.

"The glass was cleaned, and again filled with potatoes. After two days, two flies were seen; and after ten days, ten flies were counted. From this experiment, it would appear that the maggots before alluded to are the cause of the failure of the potato crop."

Further on, he observes: "Many such potatoes, after planting, were then carefully lifted with a spade, and in the mouldered (mother potato) were found a great number of maggots, worms, small spiders, and beetles. The question now occurs, Are these beetles and worms the cause of the putrefaction of the potato, or generated by the putrefaction?

"As I have always observed in potatoes which are sound when cut, but which have been cultivated in the neighborhood of diseased ones, a great number of the previously mentioned flies in the harvest and spring, which is not the case with fresh potatoes; and as I found, in the spring, maggots in the cavities of the potatoes, I am of opinion that the flies are the cause of the disease in potatoes."

Finally, the author grounds his hypothesis on the following observations: He says, "Three partially rotten Gibraltar potatoes were planted in a garden, surrounded by sound ones. All three, at first, went on miserably; but, owing to the richness of the soil in the garden, this unhealthy appearance vanished in a short time, insomuch that they gave a luxuriant crop, and in that respect were not to be distinguished from the others. Some days afterwards, however, I found a number of gray potato flies hovering around the Gibraltar potato in the sunshine, but which were not to be found on the other potato stalks. As the large luxuriant bulbs had swelled up the earth round about the roots, and thus occasioned cracks in the soil, it was obvious that the flies had been derived from thence."

These are the author's arguments upon which he founds the supposition

* This, the reader will remark, was precisely the character of the disease among ourselves.

that the flies above mentioned are the cause of the disease. Let us now for a moment consider the author's observations.

He plants thin, sickly Gibraltar potatoes, surrounded by others perfectly sound. These at first came up somewhat unhealthy, but afterwards grew very luxuriantly. Cracks were observed in the soil, about the roots of the stalks. All this seems, therefore, to show that from diseased potatoes were obtained large and sound ones, which sent out vigorous shoots. The author finds a great number of the previously mentioned gray potato flies hovering around the Gibraltar potatoes, and draws the conclusion that they are derived from the loosened soil.

From his observations, it is evident that the sickly shoots from the partially rotten Gibraltar potatoes produced three large and luxuriant potato plants, with excellent bulbs; and still he tries to prove that the flies are the cause of a disease which did not exist.

We should conclude, from his experiments with the different species of potatoes obtained from Berlin, that the disease was not occasioned by the Gibraltar potatoes, but that it had its origin in the soil. The author does not make the slightest mention whether the potatoes surrounding the Gibraltar potatoes, which gave such a luxuriant crop, were at all infected by their vicinity.

The fact of maggots and flies being found when potatoes having woody stagnation spots were included in a glass vessel, by no means proves the author's theory, but rather the contrary, as the origin of the disease was already in the potatoes, and the maggots and flies were merely consequent on the disease; but they were obviously not the cause of the stagnation spots, nor of the incapacity of the potatoes to germinate, which was clearly consequent on the spots; and below the stalks of the plant were afterwards found maggots, worms, and small spiders. The author should have been content with the correct hypothesis, that these beetles, worms, &c., were occasioned by the putrefaction of the potato, and should have dispensed with the unnatural supposition that these insects are the cause of the corruption of the potato. The instance of the fly called the horse-sing fly, or Hessian fly, which in some provinces of North America is said to be productive of so much mischief to the wheat, and to which the author refers, is by no means a well-selected example, and proves more against than for the German authors, who have themselves visited America, and witnessed the damage which the natives affirm is caused by this fly, but which is, in reality, occasioned by an exudation of a sweet liquid called honey dew, which spreads over the plant, as if it were covered with gum, and prevents its perfect growth. The flies and insects, however, being very fond of this sweet liquid, collect on the straw.*

The author also contradicts himself when he says that "the formation of blue spots must be due to some external influence, or to some chemical agency. This seems to be absolutely necessary, because the potatoes are converted into this blue substance, and thus become assimilated, so as to afford nourishment to the insects; for it is probable that they could not live upon the potato in its fresh state."

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* The great Linnæus was also in error in supposing that the ergot (*secale cornutum*) was produced by the bite of an insect, because he always found the insects wherever the corn was suffering from this disease; whereas, in reality, the flies, being fond of the sweet drops exuding from the plants, are always to be found upon them.

As the author says that he has not yet concluded his experiments, but intends to prolong his observations, Nature will, in all likelihood, soon put him on the right track. The means of preventing this disease, which the author gives, are all either palliations, or proceed from the absurd hypothesis that the flies so frequently mentioned infect the fresh potatoes, and that these again infect others. The only specific means of preventing the disease would be to try and procure potatoes from a country where the disease did not exist; but as large quantities would be required from such a distant country, this remedy would be very expensive, and sometimes impracticable; and thus the cultivation of potatoes from the seed apple is the only radical cure for this disease. But this method has other advantages, which will appear hereafter.

As this plan has hitherto been considered a very troublesome and tedious one, I shall try to explain how simple it is. I shall take the liberty of making use of a paper of mine, published in "Den Hamburgher Correspondenten," as my text book, as it is probable that few of my readers have had the opportunity of consulting the work. Hence I entertain, then, the general view that the disease had its origin in the degeneration of the potato. It has long been observed, as well in the animal as vegetable kingdom, that degeneration is transmitted by individuals, as well to race as to seed; insomuch that, among vegetables, healthy seed occasions a marked increase in the quantity of produce. When the same species of potato is cultivated for a number of years on the same kind of soil, the crop obtained sensibly diminishes.

When these circumstances are varied in such a manner that the potatoes obtained from a clay soil are again planted on a sandy soil, and so, *vice versa*, from this again to a soil only mixed with clay, then, the circumstances of temperature being the same, no diminution is to be observed in the crop. When, therefore, a tenant has the misfortune to raise such potatoes as, when all possible care has been taken in gathering them, (namely, that they have not been dug up in wet weather, mixed with moist particles of earth, or laid in deep pits in too thick layers over one another,) undergo the dry rot, it is natural that such potatoes are not to be used for planting, but that others are to be tried, which are not infected with this disease. But as the disease may extend over so large a district that it may be difficult or impossible to obtain sound potatoes for planting, it is necessary to resort to other means—namely, to the cultivation of the potato from the seed apples; and, in doing so, it is necessary to pay attention to the following directions: In the autumn, when the potatoes are taken in, which is not generally done before the stalks are withered, there may be collected a large quantity of the seed apples, which are to be preserved in a vessel through the winter, under such circumstances that the mucilaginous matter which is contained in the fresh apples surrounding the seeds may be completely frozen; which has the effect of allowing the seeds to be washed out and separated with greater facility in the spring. This work is to be done in January, and the small seeds are in February (if the weather permits, or, if not, in March) to be sown in a large garden bed, as thinly as possible, in rows from ten to twelve inches apart. These rows can be placed under a hot-house window; and, in that case, the operation can be performed in January. During frosty nights, however, the beds must be covered with straw. When the small potato plants begin to be visible, they appear with two small sprouting leaves; the third leaf already looks like a rough potato leaf. The rows in

the garden bed must be kept clear, as the young potato plants grow much more rapidly in the light.

The land on which these young plants are to be planted out must be previously well manured; and, if in a garden, well turned over with a spade; or, in the case of a large quantity of seed apples being taken, and there being consequently a great number of young potatoes to be planted out, a large piece of ground is to be selected, free from weeds, (and which, if possible, is to be a second-rate old lea,) which, after it has been well manured, must be ploughed as deep as the vegetable mould renders it prudent to go.

When the greater part of the potato plants have grown to the height of from four to five inches, they are to be hoed by means of a hand hoe, and the soil so loosened about them that their large plants can be drawn out with a slight pull of the hand. On the same plant will then be observed two distinct kinds of roots, namely: the usual fibrous nourishing root, and other short and somewhat thicker white roots or twigs, which have a broad hatchet-shaped extremity, upon which small potatoes are already to be seen. The larger plants are to be carefully gathered out from the smaller ones, and laid in a hand basket along with lumps of earth which adhere to them. The small plants are again pressed down into the soil with the hand, to allow them to grow larger; and when they have obtained a sufficient height, they are to be planted out in the way above described. In the garden, or piece of ground, lines are now to be marked out, first along the length of the field, and then across the breadth, two and a half feet apart; the soil being of course previously well disintegrated by ploughing and harrowing. In the exact point where these lines cross one another, holes are to be made with a *dibble*, which must make so large an opening that there shall be plenty of room to introduce the potato plant. The earth is then pressed down around the plants, with the hands. If it should happen that some of the plants are too small, two of them may be put into the same hole.

The most suitable time for transplanting the young plants is, with regard to the weather, as well as to the growth of the plants, from the beginning of April to the middle of May. As soon as the first weeds are seen, they must be extirpated with the hand-hoe, particularly round the roots of the young plants. When the plants begin to grow larger, and show leaves, the spaces between the plants are to be ploughed up with the simple potato plough, which cuts through the roots of the weeds in such a way as not to cause the soil to rise up. In doing this, the horse must be led by a boy, else many of the plants would be destroyed by its feet. If the weather is moderately fine, the plants grow healthy, and enlarge in leaves, twigs, and stem, just as rapidly as those plants which are cultivated from the bulbs, and which lie in the soil three or four weeks before their leaves are visible above the surface of the soil; so that the potatoes raised from the seed apples can be gathered with the plough just as soon as those which are cultivated from the bulbs.

At the period when the seed potatoes begin to flower, the attention of the farmer is particularly requisite, inasmuch as many varieties of flowers are to be observed arising from the apple, from which the seeds are collected. The author has cultivated potatoes from the seed six-and-thirty years, and has obtained potato plants which have produced white, flesh-colored, light, and dark-blue flowers. Each variety of flowers had also a particular form of leaf, as well as certain peculiarities, both in the bulb and in their taste.

The potato plants, however, always gave a greater number of flowers, resembling those of the plant from which the seed was taken; and sometimes only a few varieties could be observed.

For example: the apples taken from a large cattle potato, with strong stems, and large coarse-grained leaves, and the potatoes raised from them, showed the same general analogy in their appearance. Those who wish to cultivate potatoes with advantage from seed, so that they can be used the first year, must not neglect to put sticks to every separate variety of plant, with a mark of the kind of flower; so that, in harvest, those potatoes which had different flowers may not be mixed together. When the time arrives for gathering them, all those having the same kind of flower must be carefully separated from the others, and preserved; so that the farmer is thus able to choose those which he finds to please him best, both as to taste and appearance, and with regard also to the purposes for which he means to cultivate them; and which may be either for the manufacturing of brandy, or for use as food, both for cattle and for the table.

Upon harvesting the seed potatoes, one observes, with astonishment, that the stalks are just as large as those grown from the bulbs; but the experimenter will probably be still more astonished, particularly if he has never before tried this mode of cultivating potatoes, to find that below the stalks are to be seen a great number of large potatoes; or perhaps he has formerly entertained the very general opinion, that potatoes raised from seed never attain, in the first year, a larger size than that of from a pea to a nut.*

But, at the same time, it must not be forgotten that, below the stalks of the potatoes raised from seed are frequently to be found a great number of small potatoes, which is dependent on the variety of seed from which the potatoes are raised. For example: when the seed apples are taken from a variety called the Dutch table potato, there is always to be found a larger number of these small ones than is the case when the seed is taken from the large cattle potato with white or red skins.

When the plants raised from seed are grown in a warm place, so that they are sufficiently large to be transplanted in April, provided no night frosts occur, which are always very hurtful to young plants, and the ground is kept loose and free from weeds, these plants give just as large a crop as would be obtained by planting the bulbs from which the seed was taken.

This mode of cultivating the potato (from seed) has been known from sixty to seventy years; but it has been very little adopted, which is owing to those who have made the trial sowing the seeds too thick, and thus leaving the plants too little room to grow. Under these circumstances, the potato could not well be larger than peas or nuts; and, in consequence of these imperfect trials, the opinion has very naturally obtained, that it requires from three to four years before the potatoes raised from seed can attain any considerable size.

Even so long ago as the year 1804, the author published an outline of the mode of raising potato plants from seed, as well as of the mode of transplanting. But this outline has either been unknown to agriculturists, or has been overlooked by them. When this method has once been introduced, even though only partially, into practical agriculture, it is probable that the value of the potato for the use of man will be estimated more highly than it has ever previously been. We are yet ignorant what new

* Most gardeners in this country know very well how to obtain large potatoes from the seed in a single season.

varieties may be obtained by this mode of culture, with regard to *nutrition, mealiness, and fine flavor,* and which may yet be obtained, far superior to any thing hitherto known to us; because all the kinds hitherto known to practical farmers have degenerated very much from the seed or stock from which they were at first raised. The cases are similar with the varieties of the potato, and with our fruit trees. A bud or twig of an improved tree, when it is grafted on another, brings forth the fruit of both varieties of trees; but when the seed is employed, only one variety is obtained; and so it is with the potato. During the experience of more than forty years, the author has never seen it otherwise than that the bulbs, when planted out, always produce the same varieties, both of flowers and bulbs. It never happens that a bulb having a white skin produces a bulb having a red one.

The bulbs can, of course, be larger or smaller; but they always retain the character of the original variety, as well with regard to the flowers as the bulbs. The latter are not the fruit of the plant, but merely scions from it, in the form of bulbs—exactly like the bulb of an improved fruit tree. The different varieties of the potato may be produced in the same way as the varieties of fruit trees are generated by the kernels or stones It, however, sometimes happens, when potatoes are cultivated in a garden, or even in a field, and are planted year after year on the same spot, that from the seed apples spring up a number of small plants at the same time that the land is next year planted with potatoes. If it happens that one or more of these potato plants grow upon the spot where a bulb is planted, they both grow up together, and their plant produces greater or smaller bulbs, which, under these circumstances, may very easily be overlooked. When the farmer frequently cannot perceive this, it is not to be expected that a common laborer can do so. When potatoes, grown under such circumstances, are again planted out in the following year, differences are to be observed in the crop obtained, and one is apt to believe that this is owing to the degeneration of the bulb. The author has very frequently observed, that when he has sown barley or oats on a piece of land upon which potatoes had grown before, and had borne seed apples, (all varieties do not yield seed apples,) between the barley or oats were a number of small potato plants, which were not generated from the bulbs left the year before, but were produced from the seed of the seed apples. He has often taken up these plants, and transplanted them; by which means he obtained new varieties.

To recur again to the outline of the potato disease, mentioned in the commencement, in which the author considers the disease to be caused by the seed potatoes being too seldom changed, through which is occasioned a weakness in the vital energy of the whole organism of the plant. As a proof of the truth of this circumstance, the following may suffice: That in the neighborhood of Hamburg, as well as also in Holstein, there is not the slightest trace of this disease to be seen, and no complaint of it has ever been heard; the reason of this being, that, in the vicinity of Hamburg, there is always an opportunity of obtaining good seed potatoes, inasmuch as a great number of vessels arrive with potatoes from Holland, East Friesland, and the marsh districts of Hamburg. From these vessels the farmers in the neighborhood bring their seed potatoes; because experience has proved that these potatoes, when cultivated, generally give a better crop than those grown upon their own land.*

* If there be really no disease in the Hamburg potatoes, might not some of them be easily brought to this country for seed ?

The potatoes grown from the seed apples seem, also, to have a more vigorous growth than those which are obtained from bulbs, that have been used for seed for many years.

In those places, therefore, where this disease exists, and where there are no opportunities of obtaining, easily, an exchange of seed potatoes from those places where it does not exist, the mode of cultivating potatoes from the seed apples, above described, is the quickest and surest method of eradicating the disease.

No. 9—(16.)

REMEDY FOR THE ROT IN THE POTATO.

Mr. Editor: I notice, in the November number of the Cultivator, complaints made about the "rot" in potatoes. I was troubled with it for many years, and, having found a remedy, give it for the benefit of your readers.

The rot in potatoes in this section of the country commenced about ten years ago. One-third of a crop was frequently lost by it; and often, in the spring, hundreds of bushels have been thrown from the cellar quite useless. For some years past, I have used slaked lime, which I sprinkle on the potatoes as soon as they are cut for seed, and shovel them over in it, and plant them immediately. Since I have adopted this plan, I have not lost a potato, either in the ground, or after they were put in the cellar; and such of my neighbors as follow my example are alike fortunate, and in no way troubled with the rot.

When other potatoes were troubled with the rot, three varieties of mine were exempt from it, viz: the "cups," "black apple," and "red apple" potatoes. I shall be glad if any of your correspondents can explain why they, with the same treatment, were not subject to the rot like other kinds.

I find it best to plant each kind of potatoes separate; otherwise, if the seed is mixed, a few years will produce quite a different kind of potatoes.

I have often raised seed from the potato balls, adopting the mode recommended in the November number. The potato will obtain its growth in four years; but the second year, the best variety may be selected for yielding and for the table.

About seven years since I raised from the ball an excellent kind of potato, resembling very much the "white blue-nose," which I call "Howards." They yield largely, and are of fine flavor, and preferred here to the "white blue-nose."

If any of the above varieties of potatoes are wanted in your neighborhood, I can ship them to Boston; and if you will accept a barrel as a sample, I will forward them as you may direct.

Yours, truly,

JOSEPH WALTON.

St. Andrew's, N. B., *November* 20, 1844.

Remarks.—We thank our respected correspondent for the above statement. The mode by which he has succeeded in preventing the rot in his potatoes is certainly worthy of a trial by our farmers. The experiment will cost but a trifle, and can do no harm, if it should fail of success on our

soils. A barrel of samples, of such varieties as Mr. W. may deem best, will be very acceptable. They may be shipped to Boston in the spring, to the care of A. D. Phelps, 124 Washington street.—*Albany Cultivator.*

No. 9—(17.)

ROT IN POTATOES.

For the Salem Gazette.

Having seen various communications respecting the disease that affects the potato, none of which (with the exception of Mr. Teschemacher's) seem to be authorized by the appearances which the diseased potato exhibits, I have thought it might interest those who are examining the subject to see the following abstract from the *Annales des Sciences Naturelles* of September, 1842, which is given in the Microscopic Journal for 1842, page 322.

So far as I have been able to inspect the diseased potato, the appearances here described correspond with those I have witnessed, and generally with such as are described by Mr. Teschemacher—except that I have not seen the extreme hardness that is mentioned, nor have I taken sufficient time to form an opinion of the contagious character of the disease.

The communication was by M. de Martins, from observations made through several years in Germany.

"*M. de Martins, on the dry gangrene of potatoes, observed for several years past in Germany.*—Potatoes affected with this disease become as hard as stone, so that they may be struck with a hammer without breaking. They retain this hardness in boiling water, and resist even the action of steam.

"What renders this affection a matter of serious importance in agriculture is the fact, that, at its commencement, it causes no trace of alteration, although, when the potatoes are planted, they are no longer capable of germinating.

"The disease appears to have first shown itself in 1830, in several districts contiguous to the Rhine. At present, it has been observed principally in the Palatinate between Cologne and Nuwied, near Erfurth; in Saxony, Mechlenburg, Bohemia, and Silesia. It appeared as a true epidemic; and, like all diseases of that kind, presented many singular characters, difficult to be explained. It occurred, indifferently, on all varieties of the potato. On examining the gangrenous tubers which were sent to him from different parts of Germany, sufficiently distant from each other, M. de Martins found on all of them a minute mildew, more or less developed, to which he gave the name of *fusisporium solani.* His observations convinced him that the presence of this minute fungus was the cause, and not the effect, of the disease, as had been supposed by several agriculturists, and even by some distinguished botanists.

"This epidemic, then, of the potato, appears to belong to that class of diseases which are attributable to the development of a parasitic vegetable. It bears considerable analogy with the ergot, mildew, rust, &c., and it is to be feared that it will prove as difficult of eradication as these latter.

"The symptoms differ according to the degree of development of the disease. At first, the potato presents no external appearance of it, excepting some reticulated spots of a deeper color, caused by the partial desiccation of the cuticle. In a short time afterward, the potato becomes still more

dry, and presents in the interior several portions of a blackish, livid color; and there are now observable, also, very minute portions of a whitish color, which are the rudiments of the *fusisporium solani*, which appears, like any other *mycelium*, in the form of a ramified fibrous tissue of extreme delicacy.

"These rudiments of the fungus are found dispersed here and there, in greater or less abundance, in the interior of the potato, where its growth is extremely rapid. It penetrates the epidermis, and appears on the surface in the shape of little whitish filamentous tufts, at the summits of which innumerable sporules, or grains, are developed, which are very readily dispersed. At the same time, the potato becomes more and more dry, and acquires such a degree of hardness that it cannot be divided without considerable force. The interior of the tuber then resembles a species of truffle, and is extremely compact, the surface being studded with minute white protuberances of the consistence of chalk, and which are, in fact, nothing more than the filaments of the fungus united in great numbers.

"If the internal structure of the potato be examined at this stage of the infection, the cellular tissue will be found partly dried, shrivelled, and torn, and the juices contained in the interstices of the cells altered. The fecula presents a great many granules, slightly swelled, frequently wrinkled and torn, and upon many of them will be observed extremely minute points, in the form of irregular watery excrescences, flat, orbicular, convex, and lobated, &c. These minute corpuscles are the beginnings, or *prima stamina* of the fungus. Should sufficient moisture be retained in the *tubera*, these growths are rapidly developed, ramify, and form the parasite of which we are speaking.

"The succession of the phenomena described may be readily followed, on placing a portion of the affected potatoes in water; the *mycelium* then becomes elongated, and assumes the form of confervoid filaments.

"During the development of this little parasite, the potato loses so much of its moisture, that at last it does not contain more than 0.35, though in the healthy condition it contains 0.73, or nearly so. The fibrous part becomes of a bluish color, and is converted partly into ulmin; the mucilaginous matter is diminished, and the albumen disappears. However easy it may be to observe and trace the various changes which take place in the exterior of the potato, and to appreciate the more marked botanical characters of the parasite, it is much more difficult to learn how this fungus is formed in the interior of the latter, and in what manner its propagation is effected by granules or spores, which are not seen to penetrate through the layers of the epidermic tissue to the interior of the cells, which, nevertheless, appear to be the seat of the primary development of the fungus.

"Three different theories have, up to the present time, been proposed as to the mode in which the grains or spores of parasite fungi act when they affect another plant, in the tissue of which they may be propagated.

"Some authors believe that the spores penetrate into the plant through the stomata. M. Prevost, relying upon an observation made on the granules of a *puccinia*, asserts that they elongate themselves in the plant. The first of these explanations considers the propagation of these fungi as a sort of dissemination; the second, as a sort of engrafting; the third theory, which is supported principally by Knight and Decandolle, affirms that the sporules of the parasite fall to the earth, whence they are introduced into the plant with the juices absorbed by the roots.

"Some granules of *fusisporium solani* were sprinkled on the untouched and moist surface of a healthy potato, which had been brought from a country where the malady had not yet appeared. A few weeks after, the epidermis showed some gangrenous spots. The potato withered—visibly losing a part of its juices; and, after some months, the fungus was seen to come out from the interior, in the form of a white eruption. Now, as the grains of the fusisporium could not perforate the epidermis, in order to penetrate into the interior, this propagation must have been effected in some other way; and this was not, apparently, either by dissemination or engrafting.

"It is evident that it was by an organic proceeding, which may be named 'infection,' since it presents the greatest analogy with the inoculation of a contagious virus.

"M. Martins presumes that the sporule of this minute fungus exerts an action altogether peculiar upon the cellular tissue with which it is found in contact; that it alters the juice contained in the first cell it meets with, and that it thence propagates the alteration from cell to cell, in such a way that in a very short time the juices contained in the whole tissue of the potato are infected and altered, so that they react on the *parenchyma*, which is thence morbidly changed. In this view, these juices, diffused in the interior of the plant by a sort of absorption, act there as a virus, *sui generis*.

"Thus, the appearance of the fungus in the interior, and afterwards on the surface of the tuber, does not depend on the development of a certain number of its sporules penetrating into the cellular tissue, but rather on a total change effected in the juices of the plant, which have become endued with the faculty of reproducing the fungus. In this way may be explained the simultaneousness of its production in the interior of the tuber, and the organic alteration of the latter; so that, under the influence of a foreign organism, which is opposed to it, it ceases to produce its stalks, its leaves, and new tubera.

"This mode of explaining the propagation of the fungus agrees equally with microscopic observation. In potatoes affected in the first degree, minute and extremely delicate cellular productions, globular or elongated, simple or articulated, are observable, situated close to the intercellular canals, contiguous to the epidermis; which productions present the greatest analogy with the rudiments of the fungus, which, at a more advanced period, are found dispersed in infinite number on the grains of the fecula. The admission can scarcely be avoided, that this entirely new formation is (so to say) a kind of organic deposite, which is produced in the infected juices, and which eventually so alters the characters of the potato, that it presents rather the aspect of a fungoid substance, and from which the *fusisporium solani* springs, and from which it protrudes as a sort of organized efflorescence.

"Potatoes affected with this malady may be compared to a sort of *pietra fungaja*.

"When they are placed in circumstances unfavorable to the development of the *fusisporium*, the germs of which have been for some time engendered, these latter escape from them like the *boletus tuberaster* of the *pietra fungaja* of Naples. Fresh tufts of the minute *macenlo* appear in succession, and at different epochs, on the surface of the same potato.

"This dry gangrene is the more formidable to the agriculturist, from the multitude of the granules produced by the *fusisporium*, from the ease with which they are spread, and from the long persistent vitality of the sporules of fungi; in which longevity, it is most probable, the sporules of this *mycelium* participate.

"There is also another affection of the potato, named *la gale*, (*Raude* on *Kartze*,) which has been observed principally in the calcareous districts of Thuringia, in Upper Bavaria, and in Austria. It has some relation to the development of a minute fungus, of very simple structure, of the genus of the *pro omyces*. It affects chiefly the parts situated under the epidermis, and appears to be less formidable than the dry gangrene."

No. 10—(1.)

HEMP.

From the Louisville Courier.

In all parts of Europe, the greatest attention is paid to the preparation of the ground. It is invariably ploughed three times—once before winter, and twice in spring. At the last ploughing, no more ground is ploughed up, per day, than can be followed up by sowing on the same day; as the seed falling into loose and moist ground produces, in consequence, a considerable increase in the crop. Hemp, as cultivated in Europe, requires deep ploughing. The hemp seed is selected with much care, as the good success of the crop depends much on the selection of the seed; and, it is said, seed from one and the same field can only be used for two years on the same spot. In Brittany, they procure seed from Russia; in the vicinity of Anjou, they obtain seed from the Dauphiné; and the Dauphiné gets its seed from Piedmont and Naples. The quantity of seed required for a certain tract of land depends on the purpose and fabric for which the hemp is intended to be used.

Thinly sown seed will produce strong and coarse hemp, suitable only for the manufacture of cables and the coarsest kind of weaving. Seed sown very thick will produce tall and thin hemp; the fibres of which, being soft, silky, and flexible, are fit for the manufacture of fine white linen. In the Dauphiné, where the most hemp is cultivated for the manufacture of white linen, forty pounds of seed is used per acre.

After the plants commence growing, they are carefully examined two or three times, until they reach the height of six inches. Wherever the plants appear too thick, the weakest ones are pulled up by the roots, and in such a manner as to leave the remaining ones every way two or three inches distant from each other, if it is desired to produce fibres fit for the manufacture of fine linen; if intended to produce coarse hemp, suitable to make cables and sail cloth, the plants are left more than twice that distance from each other.

The maturity of the plant, towards fall, is watched with the greatest exactness and particularity. The male hemp is pulled first, after the dust from the blossom ceases to fall, and the upper leaves begin to turn yellow. To secure white, soft, and silky fibre for the spinning wheel, the male hemp is pulled before the leaves begin to get yellow. For the purpose of spinning and weaving into fine linen, the male hemp is always preferable to the fibre of the female hemp, which is invariably coarse. About six weeks after the male plant is pulled, the female matures, and is pulled. The male and female hemp should never be pulled together, as they never ripen or come to maturity at the same time, and the two kinds cannot be rotted together.

When this is done, the stalks are ready for the process of immersion for the purpose of rotting, which is the most important operation in the preparation of hemp. If this process of immersion should be badly managed, the whole crop would be destroyed by it. It requires practice and experience; but, above all, strict attention and constant examination.

In France, there is a certain class of men, called "masters," who follow exclusively the business of the immersion of hemp. The farmer hands to the *master* the hemp in bundles, as taken from the field, and pays him one bundle out of every thirteen. The hemp is immersed, whenever it can be done, in running water. Previous to the immersion, the *stalks* are separated and assorted, according to their size, length, and color; and hemp immersed at one and the same time must be of the same degree of maturity, as different stages of maturity cause a serious injury to its beauty, whiteness, and strength.

It is said that the bad smell in extensive water-rotting establishments does not impair the health of the people engaged in this business. The operation of breaking hemp is either done by hand, a few stalks at a time, or by an apparatus for the purpose. The operation varies in different countries; and in France, the hemp, after it has passed through the brake, is spread upon a common threshing floor, and beaten with grooved blocks of wood, which clears it from the remaining dust and woody particles.

Hemp intended for the manufacture of fine fabrics undergoes another process, by which it is "refined," or made so soft and flexible that it can be spun and wove into the very finest fabrics. In France and Germany, they have softening machines for hemp. It is then hackled on combs, or by a hackling machine; and if it should be required to bring it to a still higher degree of brightness, a peculiar instrument is used, termed *a polisher*, made out of wood or iron. Mr. De Koster has successfully introduced in Europe a machine for spinning and weaving hemp into any kind of fabric, from the coarsest to the finest. The largest quantity is consumed in the manufacture of cables, rigging, and sail cloth, for naval purposes; but in Dauphiné every kind of linen is fabricated from hemp; and, in the vicinity of Verona, there are annually at least 20,000 pieces of linen manufactured. The average price is about 200 francs per piece; which makes 4,000,000 francs. Exclusive of this, there is much table cloth woven, which is celebrated for its beauty and durability. The natives of that country, having no use for linen, transport the same in great quantities to the interior of France, and from thence to the fair of Burgos, in Spain. Verona has no large manufactories for linen; yet the peasants in the vicinity mostly cultivate their lands, and also weave linen. The inhabitants of the town purchase threads, and give them to be woven by the country females; and, as soon as a piece of linen is finished, it is brought to market, which is held on a fixed day of the week, and sold to a linen broker. The linen of Verona is known throughout all France; and, before it is exported, each piece is brought for inspection before the commercial committee, *who testify that the linen is of hemp*. It is then stamped, by a particular stamp, with these words: "*Toile de Verona—tout chanvre.*" Verona linen of hemp, from threads Nos. 35 and 40, is very little different in its appearance from the linen made of flax. The table cloths are woven on the machine loom of M. Cherar. Their magnificent whiteness is incomparable, and the art of perfect bleaching appears to be an hereditary gift, from generation to generation.

The good success and results of the culture and the manufacture of hemp occur always in parts of countries where the land is divided into small portions amongst the farmers—for instance, in Dauphiné, where every family has its own patch of hemp—the land for it being selected near the dwelling houses, so as to enable them to protect it better. The ploughing, and other hard work, is done by turns amongst the families alternately; as to hire laborers is difficult, on account of their scarcity, and the highness of wages. The lighter work (such as the thinning of the plant, the pulling, and breaking) is all done by the members of the family—amongst the females, children, and old people. The proceeds therefrom are put into a box (*tire lire*) where the money of the treasury is kept. They spend in this way all their idle hours on the farm, without loss of time.

At Anjou, in France, the farms owned by lords are not divided as in Dauphiné. These lords rent out their lands to families, (their tenants,) who pay for the privilege to cultivate hemp. In all cases, the rent for hemp land is much higher than for any other arable lands. For instance, in Anjou, a hectare (about three acres) of good arable land for wheat will bring an annual rent of from $10 to $12 per hectare. Land for hemp will bring from $30, $36, and $40, and in some places more. In the valley of the Loire, where the hemp grows the best, the rent for one hectare (or three acres) of land amounts to $80. Anjou hemp of a good quality most resembles the Russian hemp exported from Riga. It has been estimated that the expense of cultivating three acres of hemp in Anjou will average, say—

Rent of three acres of the best land - - - -	150	francs.
Forty loads of manure, cost 3 francs each, (2,400 pounds to the load,) will answer for one crop of hemp and one crop of wheat the next year; one-half the improvement, then, falls on the hemp, which is - - - -	60	"
Three ploughings, harrowing, levelling the ground, sowing, examining the plants, &c., will cost - - -	140	"
The seed for three acres, thin sowing, will cost -	45	"
The pulling, drying, and binding in bundles - - -	45	"
The immersion, or rolling process, and the breaking - -	150	"

Thus leaving a clear profit of 130 francs, for every three acres of land, to the farmer, or about $8 an acre, clear of all expenses.

The intelligent farmer of Kentucky will at once perceive that, in competing with the old countries of Europe in the culture of hemp, more than one-third of all the expenses they are compelled to incur can be saved by him, as he has not the same onerous rent to pay for the land, and our soil is sufficiently fertile without much manuring. This saving to the Kentucky farmer is nearly double the clear profits realized by the European cultivator. These facts in regard to the culture of hemp in Europe, and the different purposes to which it is applied, are well known to those who have taken a sufficient interest in the subject to investigate it; but I have given them, in this communication, more particularly upon the authority of Mr. Butowsky, inasmuch as his report was published as an official document by order of the Russian Government; and, in consequence, its accuracy can be relied upon. No one can doubt, after a fair examination of the mode and expense of cultivating hemp in Europe, that the United States, and particularly the States of the West, can produce an article equally as superior in every respect, and at a much less cost. And when we consider the various purposes to which every quality of hemp can be

applied—whether it is the manufacture of cables, sail cloth and rigging, coarse and fine linens, table cloths, bagging, bale rope, twine, sewing thread, and many other things of common use and necessity—no fear need be entertained of an over-production. Manufacturing establishments will always spring up wherever the raw material can be obtained the cheapest; and there is no reason why the United States should not supply Europe with not only hemp for all naval purposes, but also goods of various kinds fabricated from that material.

We can certainly produce hemp here cheaper than they can; and even, by underselling them in their own markets, we can realize to ourselves enormous profits. I shall take the liberty, before concluding this already extended communication, of quoting again from Mr. Butowsky, who, in bringing this subject before the Russian Government, says:

"To neglect the cultivation of hemp, surely, would prove neglecting an inexhaustible source of riches. Suppose it should at present be managed under more substantial arrangements, (although it is already profitable,) would we not avoid unpleasant sensations, by hearing of the advance of other nations? The farmer, the manufacturer, and the merchant, might conduct this important branch of industry in perfect harmony, seeing the advantage thereof secured to themselves, and knowing how to take the first rank as hemp cultivators and manufacturers in Europe."

Mr. Butowsky has not said one word here that is not applicable to this country; and, as the attention of our farmers and of our General Government has been drawn to this subject, it requires no prophet to foresee that, in less than a quarter of a century, the Russians will find their most formidable competitors in the culture and fabrication of hemp on this side of the Atlantic.

No. 10—(2.)

HEMP.

After cutting, whether with cradles or hooks, several methods of fitting hemp for the stack are in practice among farmers; two only of which we deem worthy of notice. Against each of these there is urged a single objection only, (so far as we know,) which will in due time be noticed. The more common of the two modes we design to notice is, to allow the crop to remain spread out upon the ground three or more days after cutting, binding up on the third or fourth day, while a portion of the bottom leaves are yet green; these bundles being set up in small shocks, to remain a few hours during the hotter portion of a clear day, will be ready for the stack. The other practice is, to tie up and shock as soon as cut, opening and turning the bundles in each shock once during the process of drying. The advocates of the latter practice reject the former, because, as they allege, that portion of the crop which lies at the surface, exposed to dew and a hot sun for three or four days, loses its fair color, and becomes unfit for the finer qualities of water rotted or fair dew-rotted hemp. The advocates of the former practice object to the other, because it contemplates always having so large a portion of the crop in shock as three or four days' cutting, at a stage in which it is susceptible of great injury from the rain.

While we leave to each individual the exercise of a sound discretion in the choice of modes to save his crop fair, we earnestly hope no one will fail

to do so. All will find it advantageous, though intending to grow only for the bagging and rope trade; for it is well ascertained that, to render a crop most productive, and at the same time most manageable at the brake, an "even rot" must be had. But this can never be the case, when, by neglect, or (as last year) by unfavorable weather, rain and dew have darkened and partially rotted a portion of the hemp lying exposed before stacking, while the bottom portions remain unchanged. Increased production, however, we consider neither the sole nor the great reason why the grower should attempt to secure his crop fair. Increased production, without a new market, is indeed rather to be avoided than desired; seeing that the great surplus now in this country keeps both bagging and rope, and the raw material, at so low a price. It is therefore mainly because fairness in color is an indispensable condition to entering either of the markets we are about to recommend, that we urge it upon the hemp grower.

We think self-interest should prompt every one to aid in raising the hemp interest from its present prostration, by diverting a portion of the production into new channels of consumption. From our own personal observation, and from the oft-tried experiment of a few pioneers in water-rotting hemp, we can safely say that the farmer will be able to realize, at the present low rate of hemp, from $6 50 to $7 per hundred weight for fair, well cleaned, water-rotted hemp, without hackling, from the hand brake; and for a very superior clean article, he may expect $8 or more. Fair dew-rotted rates something below these prices.

Water-rotting.—This process is best performed in pools excavated near a running stream, faced with stone work or plank. The water should be let in and out of the pool, at pleasure. Rotting, as practised in such pools—many of which are now in use in Kentucky—we are assured, is neither expensive nor unhealthy. It is hauled from the field or stack; put in without untying the bundles; and, when rotted, is hauled off again to some convenient place, and the bundles set up in very small shocks, or leaned against "bents"—the bundles being placed on each side of the "bents."

The bundles, being thus arranged, will dry in ordinary spring or fall weather without injury. Attention should be given, lest the hemp mould in warm or wet weather. When dry, it should be secured in stacks or sheds, if not to be cleaned speedily in the brake; and there, we are assured, lies the great obstacle to immediate success in preparing water-rotted hemp. The lint being separated from the stalk by solution, ere the woody part is rendered brittle by partial decomposition—as in the ordinary dew-rotting process—a bundle of water-rotted hemp in the brake is tough and elastic, like a bundle of rods; and the dry house seems absolutely necessary, in order to render the harl brittle and manageable.

Practical observation will be found necessary to gain a knowledge of the business in detail. Some disappointment must be expected. We caution the novice against attempting too much. Braking, under the present imperfect state of machinery, is tedious; and he should, therefore, have only such a stock rotted as will give full employment to his brakes in winter; bearing in mind the fact that, unless for some such urgent reason as giving future employment to brakes, it is better to brake as fast as one rots.

Fair dew-rotting.—This is the simplest, and perhaps, at the same time, the most profitable way of preparing the hemp crop; nothing more being required than, after stacking the hemp, uninjured by rain, and letting it remain one year, barely to spread it on grass land about the first of December.

During a cold winter, the lint is separated by freezing and thawing, and the article comes to the brake as fair as the best water-rotted. One of the peculiarities of this process—a knowledge of which may prove of importance to the cultivator—is this: as the period of the completion of the rotting process approaches, red blotches will appear both on the stalk and lint. The hemp should now be watched.

In short, this mode of preparing hemp varies little from the ordinary treatment of the article. The leading conditions are—one year's sweating in the stack; a grass sward, to prevent dirt or muddy water from staining the lint; and a period of the year when there are frequent alternations of freezing and thawing. Here, again, the novice should be put upon his guard. He will perceive that the weather most favorable for braking has been expended in rotting. Let him be prepared for a rush when the braking commences, or let him stack for a season of leisure.

No. 10—(3.)

1. *Time of sowing hemp.*—Hemp is generally sown in this latitude during the month of April; sometimes in the latter part of March; and not unfrequently in the early part of May. A good deal, of course, depends upon the season, in so changeable a climate as ours; but, taking one year with another, I should fix upon the middle of April as the most eligible period for committing the seed to the earth.

2. *Mode of putting in the crop.*—The ground should, if possible, be ploughed in the fall, that the winter's frost may reduce the clods perfectly. If this cannot be done, then the same result of complete pulverization must be reached by repeated deep ploughing, harrowing, and rolling with a spike or smooth roller. The necessity for this very particular preparation, you will see explained in my communication above alluded to. When it is thus brought into thorough tilth, and levelled by the harrow, it is then sown broadcast, exactly as you do wheat; regulating the quantity to the acre by the character of the soil, taking care never to fall below one bushel and one peck, nor to exceed two bushels. When sown, plough it in with single horse "*bull tongues*"—a species of plough between the coulter and shovel, free from the objections and uniting the advantages of each. Follow the ploughs with a roller. The roller is recommended for the final operation, in preferrence to the harrow, for two reasons: 1st, because it presses the earth to the seed, and promotes their vegetation; and 2d, because experience has taught that harrowing inclines the land to bake, if it should be followed by a heavy rain before the hemp comes up, and a crust may thus be formed which would smother many of the tender germs; whilst experience has proven that land pressed together with a roller, and then soaked with rain, will crack and crumble as it dries, instead of forming a hard crust.

3. *When matured, and how saved.*—The crop matures in from twelve to sixteen weeks. The proper time for saving may be easily determined, though exactness in this is not so material as in most crops. When the male stalks, which bear the blossoms, begin to cast the pollen, (which will be observable whenever the hemp at this stage is disturbed by wind, by a succession of clouds, like dust, which rise over the field,) the hemp is in the best state for saving. This last process, whether it is pulled or cut, is

a laborious operation, and requires strong hands. Whether the one or the other mode is observed, it is necessary, to prevent confusion and tangling, that each hand should take a "through," corresponding with the length of the hemp. After it has remained upon the ground a few days, for the sap in the stalk to dry out, tie it up in small bundles about the size of a small sheaf of wheat, using for this purpose the stinted stalks of hemp, which you will find in abundance throughout the field. Set it up in shocks of two or three dozen bundles each, to remain until it is entirely cured; which you will determine by the dryness of the stalk, showing that there is an absence of all sap.

4. *Subsequent management.*—Some permit it to remain in the shocks, as we left it in the last paragraph; while others put it into stacks, to remain till the time for spreading it out to rot. The latter is certainly the preferable mode, though involving a great deal of additional trouble. It should be spread for rotting, on the same ground upon which it grew, about the last of October or first of November. The time required to rot it, of course, depends upon circumstances, of which every intelligent farmer will be a competent judge. *Here*, it ordinarily requires several months; with you, it would require less time. To ascertain when it is sufficiently rotted, have a hand of it broken; and if the wood breaks easily, and separates readily from the lint, and the lint is strong, your hemp is well watered. Very slight experience will make you master of this.

Your next step is to have the hemp set in shocks, neat and well built, with the tops so bound together as to keep them firm against winds and secure from rain.

The braking follows; and for this you should embrace all cool and dry days, as they alone are suitable for the operation. Your brakes should be made broad behind, (from 18 to 20 inches between the slats) narrow in front, and sufficiently heavy to give them steadiness; the legs of the bench to be put on with keys, instead of wedges, that they may be tightened at pleasure. The process of braking is very simple, but it requires several years' practice before a hand is able to do what is esteemed a full day's work.

5. *Raising and preserving seed.*—Seed should be planted about the first of April; perhaps, in Carolina, three or four weeks earlier would be better. Some prefer dibbling it in drills four or five feet apart; others planting in a check, the same distance with corn. Both modes answer well. It should be kept clean, and well cultivated.

When it has attained a foot in height, it should be thinned, so as to afford the plants full room to grow freely. When they have attained their growth, and the *male plants* have generally cast their pollen, *they* should be pulled or cut, leaving only a few of the freshest scattered through the crop. This will give more room for the *female plants* to branch and spread, which they will continue to do until arrested by excessive droughts or frosts. When the pods begin to open and drop the seed—which sometimes precedes, but always follows, a keen frost—it should be cut without delay. In the morning, when the dew is on the plant, is the most favorable time for this operation. When cut, it should be set up in loose, open shocks, to dry; which will require ten or twelve days of good weather. As the seeds scatter out very easily, great care is necessary in securing them. The best mode I have ever tried is, to have a large tow linen sheet made, and spread it at the base of the shock, upset the shock on it, and beat the heads off. Have a

wagon or cart, with a close body, at hand, to convey the contents of the sheet, as it is filled, to some place of security. When you have collected it on your barn floor, beat it with light flails, and run it through a fan mill. The seed, when clean, should be spread over the floor, and suffered to remain for some days, until they are thoroughly dried, then put away securely in garners where the rats (who are as fond of them as of old cheese) cannot possibly get at them. If thrown into a heap immediately after they are gathered, they are liable to have their vegetating principle destroyed by heating. Seed carefully managed will sometimes come up the second year, but, in nine cases out of ten, seed two years old will not vegetate.

General remarks.—The yield of this crop, of course, varies like that of every other—with the exception in its favor, that it is subject to fewer disasters. No land, however, should be put in hemp which is not exceedingly rich. With such land, the product will be rarely less than 600 weight to the acre, and may reach 1,000 or 1,200. If the crop is cut before the seed forms, it impoverishes less than any crop known. Where the crop is spread upon the land for watering, the reduction in its fertility is scarcely perceptible in a term of five years. Managed upon the foregoing plan, my crops have averaged me between six and seven cents per pound *at home*, yielding me a much better profit than my tobacco, and costing me infinitely less trouble and labor.

Many in the West, and some here, are abandoning the process of dew-rotting, and are endeavoring to water-rot after the Russian mode. They are induced to do this from the fact that the Government has offered a price for the article, provided it is made suitable for naval cordage; which, if the farmers are successful in the new mode of rotting, will make it an exceedingly lucrative business. The process is simple, but requires care. I have however, as yet, no experience in it. I am now constructing vats, with the intention of water-rotting my next crop. Should you be inclined to water-rot, and desire any information, I will cheerfully communicate such as I have. The price offered by the Government is $280 per ton of 2,240 pounds.

No. 10—(4.)

An estimate of the quantity of bagging manufactured in the year 1844 *throughout the Western country.*

	Yards.
In Kentucky there are 500 hand looms in operation, which manufacture an average of 400 yards each per week, or 20,000 yards per annum: total - - - -	10,000,000
Five power-loom factories at Louisville, New Albany, Cincinnati, and Maysville, produce per annum - -	3,800,000
Eighty hand looms in Tennessee and North Alabama produce an average of 15,000 yards each per annum: total -	1,200,000
Fifty hand looms in Missouri produce - - -	750,000
Total amount of bagging manufactured in the West during the year 1844 - - - - - -	15,750,000

The average quantity of bagging used in baling cotton is 6 yards to the

bale. Thus sufficient baling is manufactured this year to cover 2,625,000 bales of cotton; which, when added to the bagging lying over unused, from the work of previous years, is from 25 to 33 per cent. more than will be required for the coming cotton crop of 1844–'45, presuming it will reach the enormous amount of 2,500,000 bales.

The quantity of hemp used in the manufacture of bagging is 1½ pound to the yard, which will make, in 15,750,000 yards, 23,625,000 pounds of hemp; and as the quantity of bale rope manufactured bears an average proportion of 1½ pound to the yard of bagging, the quantity of hemp consumed in that article will also amount to 23,625,000 pounds; making a total consumption of hemp in 1844, in the articles of bagging and rope, of 21,000 tons.

The production of hemp during the years 1842, 1843, and 1844, in Kentucky, Missouri, and Tennessee, has greatly exceeded the demand for consumption and export; and the consequence is, that from 5,000 to 8,000 tons of surplus hemp will remain in the farmers' hands unsold until next year; and this heavy surplus will greatly injure the price of the crop that will then be ready for market, unless the farmer, by *water-rotting* his crop, opens a new outlet for it at an improved price. Russia raises, it is said, 120,000 tons of hemp annually, which, owing to the mode of preparation, can be used in all naval and other purposes, where the Kentucky dew-rotted hemp cannot. Russia is almost exclusively an agricultural nation; and it is with fifty millions of serfs that she is able to produce such an immense quantity of hemp and grain. In Kentucky there is land enough that can, or could, be made to produce 100,000 tons of hemp; but the difficulties with which the farmer has to contend, are—first, *the want of a proper knowledge of the most expeditious and economical mode of water-rotting;* and, second, *the insufficiency of labor*, which must be overcome by the invention of a machine that will brake and prepare the hemp ready for market at a much less cost, and with more expedition, than the mode now in operation by the common hand brake.

There are several gentlemen, men of science, intelligence, and enterprise, who are devoting their talents and genius to those subjects; and whenever their labors are crowned with success, and these obstacles (which now form so great a drawback to the agricultural and manufacturing wealth of Kentucky) are removed, we can, with perfect prudence, anticipate an increase in the hempen interest of this State of more than twenty fold in less than five years. This can be proved by a short statement of the facts, viz:

The hemp crop of Kentucky (say) is 15,000 tons, and worth $60 per ton. This is all *dew-rotted.* Now, *had it been water-rotted*, it would have brought $180 per ton, or just three times as much. The value, then, of the crop is increased by water-rotting three-fold; and by the substitution of machine labor in the stead of hand labor, in all the modes of preparation, at least *seven or eight times as great a quantity of an article three times as valuable* would be produced with the same force, and in a shorter period of time, than can now be done. The American hemp, in point of strength of fibre, durability, and firmness of quality, can advantageously compare with the very best Russia hemp; but it is neither prepared in the process of rotting in a proper manner, nor is it ever cleaned as well in the brake as it should be. These facts, together with an examination of the dark-colored, badly-rotted, and slovenly-cleaned article that is often sold to the manufacturer as hemp, prove most conclusively that the culture of hemp in Kentucky is yet in its youngest infancy, and that this great staple product can

be made to yield, instead of two millions of dollars a year, at least —— millions of dollars, without the outlay of a single dollar of additional expense. When this improvement in the culture and preparation of hemp shall be effected, there will be brought about with it a revolution in the manufactures of our State, that will tend even more to add to the general wealth and prosperity. Instead of consuming the best hemp in the manufacture of bagging and bale rope, fabrics so coarse and unsightly, and ill prepared, as scarcely to deserve the name, and in the manufacture of which we bring our best material in competition with the *tow* and *refuse hemp* of Europe; instead of this, our worst tow, by the adaptation of machinery to its manufacture, might be used for making a much superior article of bagging than is now made, and our good hemp would be used in making canvass, or sail duck, ship cables, cordage, and even *fine linens*. What a field is here open for industry and enterprise! How many millions of dollars might be added yearly to the wealth of our State, by the mere application and employment of the means and resources nature has given us! Out of hemp not a particle better or finer than ours, the finest fabrics are now manufactured, in France, Germany, and Great Britain. Machinery of the most perfect kind has been in successful operation for years in those countries; and every kind of fabric, from the finest linen cambric to the coarse Dundee bagging, is there manufactured, and bought by us at high prices, when we have growing at our very doors, spontaneously, as it were, the very material with which we could make the same articles, and furnish them to the whole of Europe at half the price we are now paying!

No. 10—(5.)

CIRCULAR ON AMERICAN HEMP.

Gentlemen: We take the liberty of addressing you relative to this important staple of the West, having recently given it much of our attention, with the view of obtaining such information relative to an improved preparation, &c., as would be interesting or useful to those of our Western friends who may be engaged in growing, with a view to forwarding to this market.

It has been well established, that, in some of the most important requisites, hemp of American growth is *intrinsically* superior to the Russian, or any foreign production; while it possesses *all*, at least, in equal perfection; and that proper care and attention in preparation is alone necessary in order to bring it to the standard, and to command the highest rates of the best imported hemp.

From the large portions of the West capable of producing it to the best advantage—say Kentucky, Missouri, Indiana, Ohio, and Illinois—we are induced very confidently to believe that, in a few years, at farthest, not only our entire home consumption will be supplied by hemp of American growth, but that it will also form a new and very important staple in the exports of the country.

Up to the present time, the receipts of water-rotted hemp, of a quality suitable for tarred cordage for the navy, have been so small as to have no influence on the rates, and very little bearing on the large and increasing

consumption of the country; though we are pleased to notice that the quantity received during the past season has been larger than that of any former year; still the demand, both for the naval and merchant service, continues to be supplied mainly by imports—principally from Russia. Russia hemp, which may be quoted as the best standard in regard to general preparation, is assorted into first, second, and third qualities, designated "clean," "out shut," and "stuff clean," according to the following requisites, viz: equality in length and color, freedom from tow and shives, as well as to its intrinsic qualities. It is put in hands or bundles of from 12 to 15 pounds, at full length, but fastened very firmly at or near one end; and to those, especially, who may be engaged in water-rotting, we would recommend, so far as may be practicable, a similar classification, and putting into hands previous to baling.

The rates for Russia hemp, during the past year, have varied but little, and have ranged from $275 to $200 per ton for the different qualities; while Western water-rotted, from various degrees in cleanness and general preparation, embrace a very wide range—say $125 to $195. The importance of adopting the water-rotting process is, we presume, generally well understood at the present time, yet we have reason to believe that, from the want of experience, deficiency in labor, and, in some cases, natural conveniences, it will be adopted but gradually; and that much the largest portion will continue, for a time at least, to be sent forward dew-rotted.

It may be remarked, that, until the present season, the principal production of the West has been consumed at home, in the manufacture of rope and bagging for Southern markets; and, consequently, the very heavy receipts of dew-rotted the present, as compared with former years, have met a very great degree of inexperience on the part of the manufacturers and consumers, (not only of this, but of other markets,) in regard to the qualities and capabilities of Western hemp, which, with the very imperfect manner and care in preparation, has tended to reduce the rates much below its true value, as compared with foreign hemp.

The most valuable harvests of Western hemp noticed the present season have raised from 4½ to 5 feet in length; and we believe the error is not unfrequent of supposing that a very great length is desirable. We remark, however, that a large portion received at this market has been much less valuable, from its extremely luxuriant growth, and consequently harsh qualities, being suitable for bale rope only; and we would suggest that, when the soil is of such a nature as to produce too rank a growth, it should be corrected by sowing more thickly, and thereby producing a finer, and more silky, and more valuable staple. The consumption of foreign hemp at this market, of the lower grades, (say Manilla, Sisal, &c.,) is large—the rates ranging from $125 to $155, and paying a duty of from $20 to $25 per ton, (Russia and Italian, $40;) and we have much confidence that, with proper care bestowed upon Western dew-rotted, by thoroughly cleaning from tow and shives, it will, ere long, entirely supersede the above descriptions; and we attribute the extremely low rates of the past season much less to a large production, than to the imperfect manner and care of preparation, and the careless order in which it has generally been sent forward.

A very large portion, especially when shipped from so great a distance as Missouri, has arrived in extremely bad order, from *insecure baling;* and we would urge upon shippers the importance of correcting the manner of baling

and would recommend having the bales covered by a strong wrapper, (allowing one or both ends to remain open,) and thus preserving it in comparatively good order, and at the same time affording an opportunity to have it permanently marked.

We would also notice that, contrary to general expectation, the various *new* purposes to which dew-rotted hemp has been applied, especially for tarred cordage, and for which it has heretofore been considered entirely unsuitable, have created an improved demand and rates; and the very heavy stock recently upon the market has been taken by the manufacturers, while the demand continues active at $105 to $115, with a fair prospect of further improvement.

We feel very confident, therefore, in the belief that the better knowledge and experience of our manufacturers, with the additional care which we trust may be bestowed in preparing it for market, will insure much more favorable rates for the present than the past season. We shall give a prominent share of our attention to the sale of Western hemp, and are prepared with storage peculiarly favorable for exhibiting it to the best advantage; and having a large acquaintance with manufacturers and consumers, we feel well prepared to do justice to this very important Western staple.

Very respectfully, yours,

WM. McKEE & CO., *Philadelphia.*
CURTIS & STEVENSON, *Boston.*

No. 11.

FLAX.

PATERSON, *December* 20, 1844.

SIR: I have been favored with your letter of the 12th instant, asking my opinion as to where the best flax is grown—tending, mainly, to remind me of a promise which I made you at Washington; with which I will proceed to comply as far as my recollection of what you require will serve. Had you, however, put your letter in the form of particular questions, I would have replied more fully than I can now do, from not precisely knowing what you desire to be informed of.

Flax that is good for one purpose may not answer for another; but, speaking without reference to the economy of its application, I should say they would stand thus:

The Flemish flax is the best; Irish next; Russian, Prussian, the New York, and, lastly, all the flax grown in this State. The Flemish is left to go to seed, and is water-rotted in the curing. Irish, Russian, and Prussian, are pulled when the bloom falls, and water-rotted. All the American I have ever seen is left to go to seed, and is dew rotted—the worst possible process for the manufacturer. When the crop is left to seed, it will make less flax.

The average abroad, from their agricultural reports, will be about 600 pounds; whilst in this State, in the best districts, it will scarcely average 500.

One cause of this may arise from higher cultivation, and more attention to, as well as the mode of, curing; but the great difference will arise from the different periods of pulling. To the manufacturer it is very important. The water-cured flax will make a stronger thread; bear the variations of the atmosphere, the process of coloring, without injury, and bleach a clear white without much difficulty. The dew-rotted flax will not make so

even or so strong a yarn; it rots if steeped in water and dried frequently, the changes in the atmosphere easily destroying it. It is so much weakened in coloring and bleaching, as to be almost unfit for use; and the difficulty and expense attending the latter process is so great, that I do not think it is ever attempted to make it white any where. I have tried it frequently, and with powerful chemical agents; it is scarcely possible to bring it to a uniform color.

The quality of the flax you may form some opinion of, by knowing the relative values for manufacturing uses. The following prices were paid last season, viz:

	Cents.
For the Flemish - - - - - - -	14
For the Irish - - - - - - -	12½
For the Russian 12 head - - - - - -	10
Do do 9 head - - - - - -	8½
For the Padelia, (Prussian) - - - - -	9½
For the American, (all sorts) - - - -	6½ to 7½

If you will take these prices, and carry out the product per acre, you will find that the result of the water-cured would be greatly to the advantage of the grower over the dew-rotted flax, including the value of his seed.

The process of water-rotting, I should think, would be far less troublesome, tedious, and expensive, than the dew-rot, if this be attended to properly; but, as it is, our farmers spread it out on the ground, and let it take all the chances of the weather, in hot suns, rains, and winds; and thus the quality is so deteriorated. But if they attended to the flax, dew-rotting it must be every way disadvantageous, compared with the wet process; for it appears to me, in a water tank made of wood, (say the length of a board 12 feet; 6 boards or 36 inches wide, and 3 or 4 feet deep;) into which place the flax, slanting the root down at an inclination of 15 or 20 degrees, then cover the whole with stones. Place the tank thus filled where the water could run in at top, and out at bottom on the opposite end. The flax could be cleaned and rotted without difficulty; for, if it was undertaken at a hot season of the year, and the process became too rapid, by taking out the plug at the bottom the water could be very easily changed. But I would prefer, if I were a grower, to commence rotting in October or November, (after pulling the flax in the bloom,) as in those months the temperature would be better suited. It would require to be frequently examined, in all cases; and when the fibres part readily from the wood, and become slimy to the feel, it is time to remove it for drying; which could be done by standing it against a fence, or stretching two lines across a field parallel to each other, and placing your flax upright, root down, between them—where, as they would be more exposed, the drying would be sooner accomplished.

The different kinds of flax this year in the process, which is the first manipulation it undergoes, yielded as follows:

The Dutch, 37 pounds of tow to 100 pounds raw flax—wasted 4.					
The Irish, 38	do	do	do	do	$4\frac{1}{10}$.
12 hd. Russian, 40	do	do	do	do	4¼.
9 hd. Russian, 46	do	do	do	do	$5\frac{1}{6}$.
Russian, 60¾	do	do	do	do	6.
New York, 52	do	do	do	do	$5\frac{1}{8}$.

This is an average, taken from manipulating some large quantity.

The consumption of flax in this country is increasing every year. Since I commenced manufacturing, in 1820 or 1821, there have been 12 manufactories established; and there are now, I believe, only 3 in operation. The difficulty we labor under arises from foreign competition.

There are little or no duties on the importation of the manufactured article, and on the raw material the duty has been oppressive; in truth, it has been an interest entirely overlooked. The duty on flax imported is now 20 dollars per ton—say 1 cent per pound; all manufactures not specified, 25 per cent. ad valorem. The duty on flax amounts to (on Russian, the principal import) equal to nearly 20 per cent.; so that the domestic article has about 5 per cent. protection against cheap capital and labor of foreign countries. The duty on bagging is so heavy, that very little is now sent forward. The duty on canvass is about equal to the duty on the raw flax from which it is made. The duties on twine are the same as on the quantity of raw material which enters into its manufacture; and so it is with the whole lint. I have often been surprised at this, as Western people are quite as much interested in the production of flax as the Southern people are in their cotton; for it is really mortifying that we should not be exporters of the article, with such land and intelligent people as we possess.

The best machine for cleaning flax is an invention of Messrs. Graves & Renwick, of Buffalo, New York. I think they tell me it costs $250, and will clean a ton of flax in the working day. My impression is, they use it in secret—have never sold it; nor do I know if they have taken out a patent therefor. They clean flax, and sell it; I am oftentimes the purchaser, and it is very good. I have no doubt any one desirous of having such a machine could obtain the pattern from them.

I do not know what more I can say to you; but if I have left any point untouched, or not made myself understood, you can write me further, and I will answer you frankly. The navy of the United States used canvass of domestic manufacture, made under their special direction, since the year 1819, until last year; when, by the existing law in relation to this matter, to take the cheapest article, (being the lowest bidder,) they have got into the use of Scotch canvass, which is rejected in the British navy, except for linings, as I can show you by the contracts.

No. 12—(1.)

COTTON BEDS.

From the Jackson (Mississippi) Southron.

Encourage the home market.—Curious calculation, showing how two entire crops of cotton in the United States may be disposed of.

The subjoined letter to one of our fellow-townsmen, from a planter in our vicinity, is worthy of serious consideration. The greatest evil the cotton planter has to meet now, is that arising from the *over-production* of cotton; and just so long as we continue to produce as we have done, without taking care to encourage an increased *consumption* of the article, this evil will not be remedied.

As to the subjoined letter, we think the writer unnecessarily fearful that

he may be considered extravagant. We can see nothing impracticable in the scheme, and we look forward with confidence to the time when we shall learn that half the people in the United States are sleeping on cotton mattresses, in preference to any of the various articles now used for bedding. Neither do we think he has enumerated more than half the advantages it possesses. In addition to those mentioned by him, we would name superior cleanliness; vermin will not abide it; there is no grease in it, as in hair or wool; it does not get stale, and acquire an unpleasant ordor, as feathers often do—to eradicate which, they are sometimes put into an oven and re-dried; moths do not infest it, as they do wool; it does not pack, and become hard, as moss does; nor does it become dry, brittle, and dusty, as do straw, hay, or shucks. Besides its advantages in all these particulars, it is in many cases medicinal. For example: it is well known that raw cotton, worn on the parts affected, is one of the best and most effectual cures for rheumatic affections. Sleeping upon it, merely with the intervention of cotton ticking and a cotton sheet, would not prevent its medicinal action.

Again: added to the great advantage over every kind of bedding (except hay or straw) mentioned by the writer of the subjoined letter, (namely, its cheapness,) it is the best, most easy, and most healthful bed of any. It is certainly superior to all, except feathers; and it possesses over feathers the advantage that it does not cause that lassitude and inertia produced by sleeping upon the latter. If any one doubts that it is one of the easiest beds he has ever slept upon, let him spend a few nights in one of the clean, nice, comfortable beds, under the careful supervision of the tidy landlady of "Lindsey House," in this city. They are used generally in that neat and comfortable establishment, and we believe altogether. We have known many lodgers in them there, who, never having heard of cotton beds, supposed they had been sleeping on feathers; and not only that, but the best feathers, too. We were deceived ourselves in the same manner; and the prejudice we are certain we should have entertained against cotton beds, had we suspected we were to be lodged in one, was thus overcome, and much to our surprise, when we found that we had been sleeping upon cotton. We therefore advise every one, especially all those interested in the growing of cotton, to try cotton beds.

But cotton is preferable, altogether preferable, not only for the bed itself, but for the covering. To a great extent, we believe it has already been employed in what are called variously "comforts" and "comfortables"—and apt names are they to designate the article. These are nothig more than a thick layer of cotton, carded into what are called at the North "cotton bats," between envelopes of calico or muslin. Thirty cents for the cotton, and one dollar for the calico, will make one of these "comforts" sufficient to overspread the largest bed, equal to three woollen blankets, worth four dollars and a half, and decidedly lighter and more pleasant in every respect.

To our friends at the North, we say, try the cotton bedding. You have an advantage over us in the cheapness of the ticking and calico, and in the labor of making it; which would more than pay for the freight on the cotton, and make them cheaper than we can. You would have an advantage, also, in the quality of the articles thus made, by subjecting the cotton to the operation of your machinery, which we do not possess. The cleanliness and buoyancy of the cotton for beds would be increased by running it through the machine called a "*picker*" in your cotton factories; and in

carding it for the "comforts," with less trouble, and more evenly, by means of the carding machines driven by water or steam power.

We are aware that there is a prejudice against such changes as we propose in articles of every-day use. We do not believe it would be an easy matter to get the effeminate occupant of "beds of down" and "downy pillows" to give them up in favor of so cheap a substitute as so common an article as cotton. But, by persons in moderate circumstances, and those who have use for all the activity of which the body is capable, and still like a good comfortable bed, the superior cheapness, and the unimpaired elasticity of the frame arising from the use of cotton beds, we feel confident the proposed change will be considered of and tested.

To cotton planters and cotton manufacturers we say, you are particularly called upon to give the cotton beds a trial: to the first, that every thing with them depends upon an increased consumption of the article; to the latter, that we of the cotton-growing region, particularly we of Mississippi, the largest cotton-growing State in the Union, are determined to sustain you. You will see, by the calculations in the following letter, how very much you may assist us in disposing of the surplus of our crops for several years to come; while, as we confidently believe, you will be benefiting yourselves, and adding to the comforts of hundreds of thousands.

"Near Jackson, *October* 11, 1844.

"Dear Sir: In a casual conversation with you a few days since, upon the subject of our great staple—cotton—its present and probable continued depreciation in price, the gloomy prospects of the cotton planter, and other subjects connected therewith, we fully agreed that its over-production was the principal cause of its present low price; and that, unless some new source for its consumption could be found, the planter had nothing to expect but its continued ruinous depression. The article of cotton, like all other productions of labor, is governed in its price by that general law of commerce, demand and supply. In our conversation, I mentioned one source of consumption which is now little used, and which, if believed in and adopted by the American people, will add very much to the consumption of the raw material, and consequently cause an increase in its price. I mean its use for bedding. You wished my views upon the subject in writing, which I now send you. Receive them for what they are worth, and nothing more.

"I set out with the proposition that cotton is the cheapest, most comfortable, and most healthy material for bedding, that is known to the civilized world. In making this broad and bold assertion, I know I subject myself to the imputation of extravagance and presumption. But there is no truer maxim in practical life than the quaint old one, that 'the proof of the pudding is in the chewing of the bag.' That it is the cheapest, I submit the following calculation, or statement, for the correctness of which I appeal to every reasonable and practical man. I will first state, however, that the materials which are generally used by the civilized world for bedding are the following, viz: hair, wool, feathers, moss, shucks, straw, or hay.

"The most costly is hair; next in value is wool; next, feathers; next, shucks, (when properly prepared;) next, moss; and last, straw or hay.

"I have not the means of ascertaining, with any degree of certainty, the relative quantities of the different materials above mentioned, that are used in the United States for the purposes of bedding.

"I hand you a statement of the cost of a bed, or mattress, made of the different materials I have mentioned; and also the cost of a good mattress—a price at which they can be made, and furnish a reasonable profit to the maker. If there is any reason or truth in the calculations I have made, you will readily perceive the immense consumption of the raw material it will lead to. New sources for the consumption of cotton are being discovered every day. Its peculiar adaptation for uniting with other fabrics—such as silk, flax, wool, &c.—has added much to its consumption for the last few years. Every avenue should be opened, and every encouragement should be given, to new sources that may be opened to increase its consumption; for in that consists the safety of the Southern planter.

"*Statement.*

"*Cost of a hair mattress.*—They are generally sold by the pound, and cost from 50 to 75 cents per lb.; 30 or 40 lbs. will cost \$15 or \$20.

"*Wool.*—30 lbs. of wool, at 30 cents per lb., \$9; 12 yards of ticking, at 12½ cents per yard, \$1 50; labor, thread, &c., \$2 75—total \$13 25.

"*Feathers.*—40 lbs. of feathers, at 30 cents per lb., \$12; 15 yards of ticking, at 12½ cents per yard, \$1 87½; labor, &c., \$2 75—total \$16 62½.

"Moss mattress, ready made, \$12; shuck do., \$12.

"The labor of properly preparing the shucks constitutes its main cost, and which cannot be done for less than the above price, and all materials furnished.

"*Cotton.*—30 lbs. of cotton, at 8 cents per lb., \$2 40; 12 yards of ticking, at 12½ cents per yard, \$1 50; labor, thread, &c., \$2 75—total \$6 65.

"I say nothing of straw or hay, as they are but little used.

"You thus see at a glance the relative cost of a bed or mattress made of the different materials. In point of cheapness, the cotton is far preferable; in durability it is equal, if not superior, to any of them. Six years' use of them convinces me of the fact.

"As to the next branch of my bold assertion—their *comfort* and *healthiness*—I am, you know, as fond of a comfortable bed as any one. Myself and family have used them for the last six years, and we prefer them to either hair or wool for both winter and summer. Many of our acquaintances about Jackson have used them for several years; and to them I appeal for the correctness of my assertion.

"Before I close my letter, permit me to indulge in a speculation of the probable effect the universal use of raw cotton for bedding, if adopted by the people of the United States, would have upon its production.

"The United States at this time is supposed to have 20,000,000 of inhabitants. It is fair to presume that, upon an average, it requires a bed for every three persons. This, then, would give (say) in round numbers, 7,000,000 beds or mattresses. To make that number, then, at 30 lbs. to the mattress, it will take 210,000,000 lbs. of cotton, which, at 400 lbs. to the bale, gives 5,200,000—more than two of the largest crops of cotton ever raised in the United States.

"But it is not by any means to be expected that the people of the United States would at once dispense with the beds which they have at present in use. I am not fully informed at what periods, or length of time, bedding made of hair, wool, and other materials mentioned, have to be laid aside, and their place supplied by the same, or materials of a different sort. Some persons think — years, according to the value and durability of the materials of which they are made. I have not the means of ascertaining;

but, if the cotton grower can succeed in convincing the people at large of the correctness of these views, it must inevitably lead to a gradual substitution of raw cotton, to the exclusion, in a great degree, of other materials for bedding. The annual amount consumed will depend upon the confidence in the cheapness, comfort, and healthiness of the article.

"While I am speculating on this subject, indulge me in another. Suppose Europe, which now consumes four-fifths of our raw cotton, should embrace these views, and substitute it as an article of bedding: imagination could hardly conceive, and arithmetic could hardly calculate, the amount it would take to supply the demand.

"But I tire your patience; I will close. It is an interesting subject to the planter. I could write a homily upon it (and a sensible one, too, I think) as long as a modern political dissertation upon the tariff.

"I claim no merit for the originality of these views or suggestions. Public attention was called to this subject several years since, in a series of numbers published in the 'Clinton Gazette,' and attributed to the pen of our worthy countryman, Dr. W. W. New—if correctly, I know not.

"Yours, respectfully, "P."

[For an interesting article on cotton seed, as affording oil, by J. Hamilton Cooper, Esq., but received too late for insertion here, see appendix No. 42.]

No. 12—(2.)

LIVERPOOL COTTON MARKET OF 1844.

From a late Liverpool paper.

In addition to the information given in another column, we annex the following from the circular of a highly respectable house engaged in the cotton trade, at this port:

"Assuming the quantity held in the interior to be the same as at this period last year, the consumption will be found to have increased about 950 bales weekly. When it is considered that this increase has taken place in a year, in which the transition from the spinning of coarse to finer numbers of yarn has been very general, which tends to limit the consumption of cotton, no stronger proof, if the fact itself were not sufficiently notorious, could be adduced of the advance made in the spinning and manufacturing departments of trade, and the consequent prosperity of these great branches of national industry.

"To recapitulate the events of the past year has always been one of the objects of our periodical circular; but, on the present occasion, they are of so simple a character as hardly to present any thing beyond the mere record of disappointed hopes and expectations.

"In January the sales of cotton were of vast magnitude, averaging weekly upwards of 70,000 bales; and of this amount, speculators took more than one-half. It was the supposed confirmation of shortness in the coming supply that led to such enormous transactions; and, as a consequence, to an advance upon prices—which had already risen 30 per cent. from the lowest—of an additional $\frac{3}{8}d.$ per lb. The month of February (after the week terminating on the 3d, when the sales were 109,520 bales, or 8,600 more than the memorable week in 1825, the largest week previously known) was much less animated than January; but the receipts in the American

ports having, by the advices, fallen off 300,000 bales from the corresponding period of the preceding year, holders still felt great confidence. In the face of a decided indisposition on the part of spinners to hold stock at the current rates, and in spite of the efforts making publicly and privately to counteract the advance here, no other cry but that of short crop seemed to be listened to; though it ought to be observed that in New York, where parties are proverbially sanguine, when advices were received there of English consumers being unwilling, notwithstanding their good trade, to pay an increased speculative price for cotton, or even the advance already established—and were combining together, not merely to prevent the market from going higher, but to effect a reduction, by working short time, and using up their stocks—an unfavorable effect was instantly produced, and became the first cause of arresting the operations of American speculators, and inducing them to pause. Here the consequence of the same information was hardly perceptible; and it was not until about the middle of the month of March that the strong excitement began to diminish. The packet which arrived on the 14th gave the first serious blow to the expectations of the holders. The receipts into the ports were much larger than had been anticipated; and this fact, not only much alarmed the timid, but began to stagger the most incredulous. Speculators soon became frightened, and, resolving in many instances to sell, they rushed out of the market with considerable precipitation. Prices, as a consequence, gave way before the end of the month, ½*d.* to ⅝*d.* per lb; and even at this reduction there was no facility in making extensive sales. The feeling throughout the month of April continued unfavorable to holders; and although the accounts from India were universally of a most encouraging description, prices again fell ¼*d.* to ⅜*d.* per lb. But the middle of the month of May was the period which finally disabused the most confident; when, by the packet of the 1st, the receipts into the ports had already exceeded 1,750,000 bales. This amount had been hitherto looked upon by many as nearly the maximum of crop. It now became a matter of certainty that it was not even the minimum; and 2,000,000 bales were soon regarded as much nearer the probable result.

"It was now that the market lost all its previous comparative steadiness. In vain did some persons reason upon the excellence of trade, the abstract lowness of prices, the impossibility of continuing to import cotton at the existing low rates, and upon the unfavorable appearances (just then beginning to be alluded to in the American letters) of the coming crop; buyers looked at nothing but the present stock and the expected supply; all other arguments were thrown into the shade, and proved unavailing to induce the trade to make a single purchase beyond what was immediately required. Prices, as was natural in such a state of discouragement, continued to give way, and the quotations were reduced during the month ¼*d.* to ⅜*d.* per lb. In June this further depression led to a slight, but only temporary reaction. The fears of those who had supposed the crop might even exceed two millions of bales, began, in some degree, to subside; and symptoms of reviving activity on the part of speculators again were manifested. Spinners, also, who, by their long withdrawal from the market, appeared nearly exhausted, (their purchases having averaged, for a period of three months, only 18,000 bales weekly, against 25,000 bales for the preceding three months,) now became buyers; but the arrivals were so great as again to occasion fresh uncertainty, and to operate as a complete counterpoise to other favorable ten-

dencies. 277,500 bales were imported in the first fortnight, and 378,000 bales in the whole of the month. In July, the advices from the States, of drought in some districts, and inundations in others, slightly improved the prospects of holders; and, looking again forward to another coming crop, they imagined they saw in the distance a repetition of the events of the previous year. This feeling, and the good state of trade, combined to sustain the market partially; but the weight of stock, (which amounted to one million of bales, two thirds being American,) and the pressure that it necessarily occasioned, were considerations too powerful to be resisted. In August, the bad effects were more and more visible. The state of trade remained good, but the stock was so large as to be almost unmanageable. It is true that reports of damage done to the crop were in circulation, the result of injury from worm and caterpillar; but a deaf ear in general was turned to these, and to all other accounts of a like nature. Holders (particularly the speculative portions) began to doubt the propriety of resisting any longer the power of general opinion, and many were now tempted to realize their losses. September was, from the urgency of the like motives, if possible, more dull than August; and October again was equally unpromising. The previous advices of injury done were then said to have been exaggerated, and that the evil had been repaired; and, in addition, the season was stated to be unusually early. November in no degree improved the chances of holders; and during the early part of the present month, the desire to sell rather increased than diminished. In vain have accounts been looked for by each succeeding packet, of diminution of estimates; but this has not yet taken place, although the belief that such will be the case, and that the crop will not exceed 2,200,000 bales, has led during the last three weeks to large and important transactions, and to an advance in price of fully ¼*d.* per pound. The steamer of the 16th brings nothing new.

"The fall in price from the beginning of October (when the quotations for fair cotton were as low as in June, 1843—the period of the greatest depression ever before known) until the late revival of demand, has been ½*d.* per pound, or twelve per cent.; a fact that can only be accounted for, at a period when money was abundant, by the general discouragement which the great losses of the season had mainly contributed to produce. How these losses have occurred is very obvious. At the close of last year, few believed the crop as likely to exceed 1,800,000 bales; several thought 1,600,000 not an improbable result. The idea of 2,030,000 bales, which turns out to be the truth, was hardly once entertained. Every known event seemed, for a long time, more and more to confirm the opinion of short crop; but the premises proved fallacious. It is difficult to imagine, after this, that either sellers or buyers can, for some time at least, place any confidence in the estimates transmitted. It may be that it is impossible, on the one hand, over so large a surface of country as is now planted with cotton, to calculate exactly upon the production; and, on the other, to ascertain what quantity remains over in the planters' hands from one crop to another; or, it may be that injury is only relative, and that what is serious at one time of year, at another is easily repaired. Even the receipts into the ports seem to afford no sure criterion; for the rivers being high or low, may diminish or increase the quantity of cotton brought to market. In short, experience has shown so many supposed accurate tests to be uncertain, that, for the future, estimates will be valued at little; and it is not improbable that, having reposed our faith upon them, and been disappointed one year, we may in another fall into the

opposite extreme, and disregard all suppositions, when they are really entitled to credit. Even last year, the crop might possibly have been (as was reported) small, had only ordinary circumstances occurred; but the advancing rates at the close of the season induced the picking of at least 100,000 bales extra; which, judging from the very great inferiority of quality, would never have been gathered, but left to rot upon the ground, had it ever been contemplated that such description would be sold, as it has been, from 2½*d.* to 3¼*d.* per pound. It is plain that high prices tend to make a large crop, and low prices a small one; and this principle applied to the present position of the United States may lead to such a result, hereafter, as may cause us to deplore the unremunerating prices which have been paid, and to look back upon the late heavy fall as ultimately not so unreservedly beneficial to the spinning interests of Great Britain as many now deem it to be.

"In conclusion, one circumstance in reference to the future prospects of cotton, though not bearing very immediately upon the subject, should not be passed over in silence; and that is, the change which has taken place this year in the system of the Bank of England. Its charter has been renewed upon certain conditions; and the one which may have the greatest influence upon markets generally, is the limitation of its paper circulation to fourteen millions, upon security, and to an amount not exceeding the gold and silver it holds in its coffers. Now, though the moment may never arrive when the quantity of specie should be so reduced as to curtail the circulation to little more than the amount named, and upon which only bank notes can be issued; yet, as there is no power by which, in such a crisis, a remedy could be found, all persons contracting engagements ought to be impressed with the tendency of the change, and to bear in mind that the nature of the restriction upon the Bank of England is to make money dear and merchandise cheap. But, with this and all other circumstances duly weighed, there is still nothing in the future that is calculated to generate alarm; and whilst the state of trade continues to be as favorable as it is, (and there is every reason to suppose that the commercial operations now going on are based upon the most solid foundation,) it seems not unreasonable to suppose that cotton presents one of the most eligible objects of investment, and, as such, will continue to attract the attention of capitalists throughout the next year. It is not likely that, at the present rates, any loss can arise; whilst, if the least adverse occurrences were to arise as to the coming crop, an unprecedented advance would not be impossible. Upon the prospects of this, it seems, after past experience, useless to speculate; and yet the whole question resolves itself into one of supply. However ridiculous the assumption of 2,600,000 to 2,700,000 bales may appear, still the very mention of such an amount has not been without producing some prejudicial effect. Such an assertion has had its believers, real or pretended. It is clearly so much the interest of the numerous parties who resort to the States as buyers for European account, to magnify the crop in the first instance, so as to depress the American markets, that it ought not to be a matter of surprise that a willing ear is given to any statement, in the beginning of the season, which points to a large growth. If the crop should reach any thing like 2,500,000, or 2,400,000, or perhaps even 2,300,000 bales, there can be no great hope at present for the market, provided shipments in proportion come regularly forward; for, though the consumption is increasing, and will become still larger, if the total consumption of the world in American cotton is 2,250,000 bales, even at this rate it would

require the revolution of another season, and that an unfavorable one, to bring about a great or decided change.

"But it ought not to be forgotten that the planter may keep back his supply, and that finally he may change his object of cultivation from one description of produce to another; it being undeniable that, without adequate return, he cannot pursue his natural calling. It is true that slave labor is said to be in a different position from free, and to present a difficulty to a certain extent. But the question is only one of degree; and the same reasoning eventually must apply to all cases. If cotton cannot be grown to pay at the present rates, it is assuredly certain it will not be raised; and, in spite of every argument to the contrary, it is hardly possible to suppose that, at five cents, (which, according to the existing quotations, will be the price of the average of the crop,) planters will be induced either to grow or to sell. The future is involved in doubt; but the preponderance of the reasoning is in favor of cotton, and the evidence of this is daily manifested in increasing confidence and extensive sales."

No. 13

NORTHAMPTON, HAMPSHIRE COUNTY, MASS.

DEAR SIR: The favorable notice of silk culture in document No. 109, from the Patent Office report of February, 1843, is my apology for presenting the enclosed samples of paper, made of mulberry foliage and bark. Unfortunately, the *external cuticle* of the bark had not been removed; producing the spots, but does not injure the paper for the use intended, which was for the purpose of depositing silk worms' eggs upon something dark; and this being *unbleached*, is considered adapted to the habits of the silk worm, and is now in successful experiment.

The four samples are all of one batch; the darkest, having more of the outside cuticle, was most buoyant, rose to the top, and came off first.

A quantity of genuine Canton foliage, which retains its verdure in greater perfection and later than any other mulberry, is gathered, dried, and sent to the mill for making paper, bleached, without spots, fit for cotton paper, as hoped; and, if successful, I shall take pleasure in sending you a sample, to be preserved with the enclosed.

I began, some ten or eleven years since, to bring silk culture into notice among the members of the Hampshire Agricultural Society, believing that if we tried the right kind of trees, (such as used in China,) we could raise silk, yet could not afford to pay $1 per tree, as then asked for multicaulis; not reflecting how easily they could be propagated by cuttings and layers. Under this view of the subject, I wrote to the Rev. E. C. Bridgman, missionary at Canton, China, a native of Hampshire county, with the request that he would procure and forward me some *mulberry seed* of the most approved kind for growing in China, for the use of members of the agricultural society. He promptly attended to the request; the seed was forwarded, and sown in the spring of 1834 or 1835. It grew finely, and developed a splendid leaf.

About two years since, while Dr. Parker, with a Chinaman, was here on a visit, on being shown the Canton foliage, it was readily recognised. As the trees had *grown* here very luxuriantly, and developed a larger leaf

than in China, Dr. Parker suggested that our soil might be more congenial to the plant than even China, its native soil.

Soon after receiving the seed from Canton, a friend sent me another parcel from the south of Asia, with high commendations, that if it would grow here, it would be of essential benefit to the United States for raising silk. It succeeded well, and is more hardy than the white mulberry, very productive in small branches, and a good-sized leaf. I named the latter Asiatic Canton. These two kinds are highly approved of for feeding silk worms—the Canton for leaf feeding, and the Asiatic for branch feeding. I have, however, almost every variety which was propagated during the mulberry speculation—covering, altogether, some ten or twelve acres, besides a large number of young Canton and Asiatic seedlings of this year's sowing, from seed of my own raising, to enlarge the plantations.

A few days since, the Rev. William Richards, of the Sandwich Islands, with the young prince, called on me. At a former visit, I had supplied him with Canton mulberry seed, silk worms' eggs, and dry mulberry foliage to use in case the eggs should hatch on the passage; but they did not hatch until his arrival home. About the same time, other eggs had been received there from China; but the cocoons raised from them were not one-quarter as large as the American, and must have required some 10,000 to 12,000 to make a pound of silk, while in America 2,400 to 3,000 would make a pound.

Mr. Titcomb, also a silk grower in one of the islands, having the American and Chinese, crossed them; but the crossing produced cocoons so small as to require from 5,000 to 6,000 to make a pound of silk, while not over 3,000 of the American would be required to do the same thing.

Mr. Richards was shown several pamphlets, newspapers, cap and writing paper, supposed to have been made of mulberry bark. He said rags were not used in India, China, or the islands, for making paper, but they always make it of some vegetable leaf; that the bark was too valuable for that, and was used to make fabrics.

We, as Americans, have the appropriate soil and climate for the Canton and Asiatic mulberry, with the peanut variety of worms, which, being managed with due care and attention, together with the skill, ingenuity, and perseverance of Americans—and, in addition, could we have the aid of our country to encourage new beginners—we might hope to compete with any nation in the production of silk, their cheap labor and cheap living to the contrary notwithstanding. There is abundant evidence that worms fed exclusively on the Canton mulberry have been larger, and produced heavier cocoons, by one-third in size of worms and weight of cocoons, than by other feed. I have supplied an order of the peanut variety of eggs, to go to Guatemala, Central America; and Canton seed, of my own raising, to go to Rio, South America; and now have an order for a number of the genuine Canton mulberry trees, roots, or cuttings, to go to Lima, South America, where the applicant went on business, a few years since, taking with him a few multicaules, at $2 each—now multiplied to 50,000; who, without any practical knowledge of raising trees, reeling and manufacturing silk, or having seen a silk worm or reel until he introduced them in 1843, has now presented me with beautiful samples of *floss cocoons, reeled and sewing silk,* done by ladies as a diversion, without any assistance, and very little instruction from him. The silk is of good quality. Samples had been sent by a mercantile house in Lima to England, for an opinion of the quality; but no return had been received when he came away. He has come to this

place with a native Spaniard, to obtain more perfect information in all the branches of reeling, twisting, coloring, &c.; to procure machinery, with a view of enlarging operations, so that he might turn off twenty-five pounds per day of sewings, cords, braids, &c. He represents the climate and soil as adapted to the culture of silk, and could feed every month in the year; that the necessaries of living are procured with but little labor; that the laboring population are indolent, the wealthy classes too proud to labor. He feels encouraged of success, and that he can introduce habits of industry by silk culture, that would counteract their natural indolence; and he will inform me of his success in due time, that may be more interesting than speculations upon what he intends doing. He has engaged several to perfect themselves in reeling, &c., to accompany him when he returns to Lima with his machinery. He has become so satisfied with the superiority of the genuine Canton mulberry, that he has engaged to take it on with him for propagation and use.

I have letters from widely distant locations, rendering favorable accounts of this year's success in growing silk, and in corroboration of the prevalent opinion that the silk cause will finally prevail, and become of great national importance. I have several letters on this subject—one from a gentleman presiding over one of our most ancient and eminent literary institutions, under date of June, 1844. Discoursing about the culture of silk, he writes as follows:

"If this earnest waking up to a scientific and practical consideration of the subject be not soon crowned with signal success, it will not be for want of enterprise or skill in our countrymen, but merely from the high price of labor here, compared with the scanty wages given in other silk-growing countries. Even this consideration, though it may *retard* for a while the complete success of this department of productive industry, will not prevent its ultimate *triumph*."

Another gentleman, under date of August, 1844, writes from the far West, that the soil and climate of the Western and Southwestern States are admirably suited to the growth of the mulberry and raising silk worms, and that eventually the two great staples of the Western and Southwestern States will be *silk* and *wool*. It is the opinion of competent skilful silk manufacturers, who have made critical experiments upon the Pongee silk (so called) of foreign make, by tests which they consider satisfactory and decisive, that it is only a vegetable production, and that the material was never operated upon by the silk worm. There can be no reasonable doubt about the ultimate success of silk culture in some *future* years; but to accelerate that desirable event, which may constitute an important American staple for revenue, (which might not only enrich the Government, but reward the labor of personal enterprise,) a bounty is deemed necessary to stimulate and encourage that portion of the agricultural population whose circumstances or health shall disqualify them for the more laborious exercises of the fields, to commence operations upon a new and untried crop. Our extensive imports of raw and manufactured silks are encouraged by us as consumers, instead of being producers. We now contribute to support foreign enterprise and industry, to produce the article of silk, which we might, with proper encouragement, raise ourselves, not only for our own consumption, but for exportation.

Very respectfully, yours, &c.

DANIEL STEBBINS.

HENRY L. ELLSWORTH, Esq.,
Commissioner of Patents.

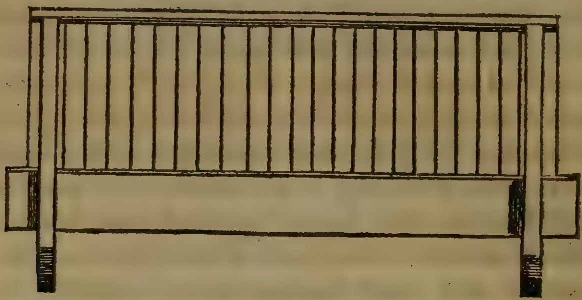
No. 13—(2.)

CULTURE OF SILK.

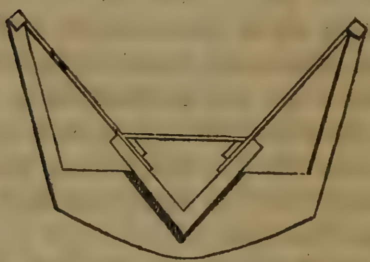
From the American Agriculturist.

As requested, I forward you a sketch of Mr. Gill's cradle for feeding worms, and the following account of the culture of silk:

Side view of feeding cradle.



Transverse view of feeding cradle.



I have five patches of mulberry, (in all, ten or twelve acres,) two pa cels of which you have seen. The one adjoining my garden, by estimation, may furnish foliage sufficient for a million and a half of worms. The mulberries consist of the white, black, alpine, broosa, moretta, alata, multicaulis, Asiatic, and large-leaf Canton. The two latter I prefer for my own use—the Canton for early feeding with foliage, and the Asiatic for branch feeding. The Canton is highly approved of for producing heavy and firm cocoons, which, by competent testimony and experiments, have been found in favor of the Canton feed as five to eight, and is the true species used by the Chinese, as testified by a resident missionary, the Rev. E. C. Bridgman, and more recently by Dr. Parker, while on his late visit to the United States. I consider the peanut variety of worms the best for producing the most silk of a good quality.

From an elevated plat near my cocoonery, you had a view of our extensive meadows spread out at the foot of Mount Holyoke. My cocoonery you have examined, with its fixtures for feeding silk worms—the mode of open feeding, ventilator, and ventilating cradles. Since you left, the whole has been completed, with hammocks suspended over the cradles, easily put in motion, and so constructed that no offal can drop into the cradles beneath, nor interfere with the rocking motion or winding; the arrangement is much admired, and estimated to accommodate half a million of worms, or more, to be fed at a time. About half of the cocoonery has hurdles of lattice work, covered in part with gauze netting four feet wide and four

tiers in height. The cocoonery is supposed to be sufficiently open on the sides, ends, and roof, to admit a free circulation of pure air. The flooring is the natural earth.

The past winter has been uncommonly severe on grape vines, fruit, and forest and mulberry trees; the Asiatic I found the most hardy of any other, and the Canton the earliest in foliage. On the 21st and 22d of May were severe frosts, destroying garden vegetables, and injuring some early mulberry foliage; ice was formed in many places. The accounts from Vermont and New Hampshire are so disastrous as to delay early feeding; while in Northampton, June 14, at one of my plantations, you saw silk worms in the act of winding, and others in good forwardness. On the day of your departure, I received a letter from a distant silk grower, a stanch promoter of the *one early* and *open* crop system, that, on account of the unpropitious season and condition of his trees, he would delay fetching out his worms until the last of June, and then make his great effort upon one crop.

To provide against premature hatching of silk worms, or the disaster of an early frost, it is advisable to have foliage gathered and dried the year preceding; which, being pulverized and moistened with water, may be given the worms until new foliage appears; and the worms will eat it freely.

To obtain the most and best foliage of the mulberry, it will be necessary every spring to cut or head them down within three or four inches of the ground, and preserve the stalks for bark silk. I have a quantity of them saved, and bark peeled from the large Asiatics, to be used for making bark silk, and a quantity of mulberry leaves saved for making paper. The whole process has not yet been carried out with either, but has been successfully done in France, as testified by M. Frassinet. I am endeavoring to have it demonstrated here, by subjecting both stalk and peeled bark to the operation of steaming with soap and water, to facilitate the separation of the bark from the wood, and the outside cuticle from the fibrous substance of the bark, before trying the operation of the brake for dressing, carding, spinning, &c. Should it prove successful, it will be made public. Hopes are entertained that what has been done may be done again; that Yankee ingenuity and perseverance may prove a match for foreign cheap labor.

The present time has been called the age of invention and improvement. But if there is nothing new under the sun; and if what is, has been and may be again, then we may hope to be benefited by the reproduction of astonishing results in all coming time; and even now, while there has been anxious inquiry for some easy mode to separate the bark of the mulberry from the wood, an historical fact has been recently communicated, by which, some two hundred and forty years ago, in the year 1600, an accident occurred, which resulted in the manufacture of a handsome fabric from the fibrous bark of the mulberry, with the inference that the bark had been previously used for the manufacture of cordage, on account of the superior strength of the fibrous bark over that of other materials used for cordage.

Under date of June 6, 1844, I have been favored with a letter from the president of one of the most ancient and eminent literary institutions of our country, who expresses his opinion of the progress of silk culture as follows:

"I am gratified to find a renewed and more general interest excited at the present time. If this awaking up to a scientific and practical consideration of the subject is not soon crowned with signal success, I am satis-

fied it will not be for want of enterprise or skill in our countrymen, but merely from the high price of labor, compared with the scanty wages given in other silk-growing countries. Even this consideration, though it may retard for a while the complete success of this department of productive industry, will not prevent its ultimate triumph."

The above is the opinion of one of the most scientific men of the age, and who, in early life, was himself a silk grower. His opinion accords with that of many others of high consideration in the United States.

While viewing the flourishing condition of one of my mulberry patches, you asked with what it had been manured? and received for answer, *ashes* and the *deciduous foliage.* The foliage, you thought, could be gathered for making paper, and answered, that there would be sufficient defective foliage left to manure the land; the foliage is richer than any stable manure, and stable manure should never be applied to the mulberry. I have not had occasion the last five or six years to use even ashes as a manure, but keep the land in good tilth by frequent hoeing. If you found these mulberries more flourishing than others you had seen, it may be attributed, in a great measure, to frequent hoeing, and dressing with the decayed mulberry foliage.

The soil is a light sandy loam; and, previous to its being stocked with mulberry, would not yield the value of $10 in any crop; and now, my feeder says, if his worms do well, he hopes to take $800 for the crop! A part of this lot being stocked with alpine, broosa, and Asiatic mulberry, of 6 to 10 feet in height, in rows 3 feet apart; and having grown so vigorously as to shade each other, and liable to have spotted leaves—to avoid this, and procure more, larger, and better foliage, I have cut away or headed down every other row, within three or four inches of the ground; and from the stumps have sprung up a multitude of thrifty sprouts, now fit for use, and the leaves three times larger than the leaves on the standard trees; so fresh and tender, that it is hoped, in some measure, that they may answer the purpose of seedling foliage, so highly recommended by M. Frassinet, who has the following encomium on *seedling* foliage: that 100 pounds of such foliage is worth near 200 pounds of old leaves to make the same quantity of cocoons; in fact, worth nearly double the quantity of other foliage. I have caused considerable bark to be stripped from the Asiatic trees cut away for manufacturing purposes; and M. Rouviere, of Lyons, has proved that the bark of young shoots, submitted to the same process as hemp, yields abundant silk fibre to make beautiful tissues. I should advise silk growers to preserve the shoots, have them barked in the best way, and the silky fibre rotted, carded, spun, and wove. M. Rouviere asserts that it will be not only fine and strong, but take the most beautiful colors. Of the bark, ropes and nets are made in the Morea, and may be used with great advantage in the manufacture of paper, together with the foliage.

The Canton and Asiatic seed sown this year are in a flourishing condition for plantation use, exclusive of several mulberry plantations which will be for rent, or growing silk on shares, next spring. Up to the first of July, worms have been uncommonly healthy—the probable effect of more open ventilation than in former years.

Mr. Dabney, consul at Fayal, (now in Boston,) has two millions of worms at present on feed. S. Whitmarsh, at Jamaica, has 360 of what he calls *creolized native* eggs, in constant feed, which go through the whole course to the cocoon in 24 days. The eggs hatch in 10 days after

being laid. He has received the silk report, and made such improvement as to save, in all, nine-tenths of the usual labor. The silk cause at Jamaica occasions great interest in England for its prosperity and success.

D. STEBBINS.

NORTHAMPTON, MASS., *July* 1844.

No. 14.

METHOD OF MANUFACTURING SUGAR.

NEW ORLEANS, *December* 30, 1844.

I received in due time your favor of December 9, 1844. In answer, I reply by a sketch of my remarks concerning the portion of the crop already made on Parkwood's plantation.

Before the apparatus was ready to work, Parkwood made by the common process 130,000 pounds, at an average rate of 1,620 pounds per acre. It was sold at 4½ cents the pound. The market was then 1 cent higher than it is now. It would not now be worth more than 3½ cents. From each thousand pounds of sugar, they obtained 70 gallons of molasses, and burned 3 cords of wood, including the fuel which supplies the steam engine.

Since the new apparatus worked, Parkwood made at a daily rate of 12,000 to 18,000 lbs. within twenty-four hours—500,000 pounds at an average rate of 2,750 pounds per acre. The sugar being of two different qualities, in the following proportions: the four-fifths of the first (say 2,200 pounds) sold up to this date at 6½ cents, and the remaining fifth (say 550 pounds) sold for 4½ cents. For each thousand pounds of sugar they obtained only 14 gallons of molasses, and burned 1 cord of wood, including the supply of the steam engine. They employed the refuse cane alone. Molasses in both cases has been sold at 18 cents the gallon.

Merrick & Towne, the assignees of the apparatus and process of which I am the patentee and inventor, may ascertain the following: 1st. An increase of 40 per cent. in the quantity of sugar obtained from the cane. 2d. An increase of 50 per cent. in the price. 3d. A saving of two-thirds of the fuel.

From the above, it may be easily perceived that the advantages of this new process are such as to double the revenue of a plantation. The saving of fuel and sufficiency of the refuse cane to make the crop is a question not only of the greatest importance for the planter, but also highly deserving the attention of the whole State of Louisiana. There are to-day many plantations where the whole of the wood is cut and consumed, and where the owners are unable to make any more sugar on account of the deficiency of fuel. There is also an immense extent of lands, and the richest of the State, which would never be applied to the cultivation of the sugar cane, on account of a total absence of wood. Such difficulties are remedied if the refuse cane is sufficient.

Merrick & Towne have determined to construct three different sizes of the apparatus, (Nos. 1, 2, and 3,) sufficient to make 6,000, 12,000, and 18,000 pounds of sugar within twenty-four hours, with cane juice at an average density of 8°. The prices are such that a planter may cover his expenses by the increased value of his first crop, and without any direct outlay.

No mineral agent but lime has been employed for clarifying. It shows at once that the advantageous results obtained grow entirely out of the apparatus itself. It worked well, in the most satisfactory manner, and without interruption. It has been managed by four hands only.

The sugar is dry, free of molasses, and ready to be shipped, and reach uninjured the Northern ports of the United States, and sustain there the competition of Porto Rico and West India produce.

I am unable to come now to a more specific conclusion; but I shall endeavor to send, within a fortnight, to Mr. Ellsworth, a complete and correct statement of the full trial made by Parkwood. I hope to be ready in proper time for its admittance in the annual report. This statement will be followed by some comparative remarks about Desranes's process going on in the island of Cuba.

I do not wish to see any particulars of the process itself printed this year. I claim publication only for the results obtained. I ought to be careful against infringements.

Yours,

NORBERT RIELLIEUX.

Dr. Fleischman.

No. 15—(1.)

MAPLE SUGAR.

Sugar has been manufactured in New Hampshire ever since its settlement. The first settlers, however, were more immediately engaged in the lumber trade, and made that business their main support for nearly a century; but, on leaving the tide waters, where the tall pine in all its beauty mostly had been manufactured into lumber for the West India market, their attention was directed to the manufacture of maple sugar. But this was so little understood, and necessity so drove them for support, that, in order to extract the juice from the tree, an incision was made with an axe in the tree, of about 3 inches deep, and from 6 to 12 inches wide, which soon encircled the tree, and, together with the wind, soon destroyed one of the most beautiful and useful trees of New Hampshire. This done, sugar-making fell off in a ratio almost to its total extinction, and so continued until what we call the second growth of maple trees grew up of sufficient size for extracting the juice; since which, the manufacture of maple sugar has been slowly improving, so that within a few years it has begun to assume a systematic course, which promises the most happy results.

Sugar is now made to some extent. One circumstance I will mention. In the town of London, near the centre of the State, 35 tons of sugar have been manufactured for several years past (to average it) from the maple tree. This statement is not exaggerated; some individuals have made a ton in a season. The process is all simple, and easy to be performed. One incision is made with an auger about three inches in the tree, into which is introduced a plug with a hole in the centre, through which the juice passes to its end, under which a clean bucket is placed, and fastened to the tree by a nail driven into the tree—no rain or snow being suffered to be mixed with the juice. When necessary, the juice is collected and put in a reservoir in

the building, where it is evaporated in iron boilers set on arches, and passed out of the boilers as soon as it can conveniently be done; this becomes necessary, as being kept long in the boilers would discolor it, and affect the flavor. When a sufficient quantity has been obtained by the above process, it is first cleared by adding milk—about four quarts to twenty-five pounds of sugar; then strained, and again heated and skimmed until all appearance of scum has disappeared; it is slowly boiled until it granulates, being cautious to prevent overheating it. It is then put in firkins, the bottoms of which are perforated with holes, with several sticks passing through the firkins, serving as conductors to lead off the molasses; the tops covered tight, so as to exclude the air. In this situation it must remain about six months before fit for use. A gentleman who made the last season 1,500 pounds of sugar (a sample of which I enclose you) from 250 trees, informs me it was the most profitable farming business he did for the year; the whole expense, after the fixtures were prepared, not exceeding sixty days' work, which will give 25 pounds to each day's labor, or $2 50 per day, at the price for which it sells. I have used some of the sugar in my family; it does not discolor the tea in the least; is clearer than muscovado, Jamaica, or Havana, white or brown, and has less sediment. I must observe that few towns equal London; and perhaps in more than half the towns in the State very little is made. I am happy to observe, however, that the quantity is yearly increasing, and the quality improving.

Respectfully, yours,

JEREMIAH WILSON.

No. 15—(2.)

Rutland, New York, *December* 22, 1844.

Sir: Your favor of December 4th was duly received, and I am happy to inform you, as far as I am able, what you desire to know of the process by which I made that sugar of which you have seen a small sample. First, the plan and manner of tapping the trees in this town is very nearly the same; that is, with a half-inch or five-eighths auger, and a spile inserted in the hole, and a pine tub to catch the sap from each tree. I gather my sap to one large reservoir once in 24 hours; then it is boiled each day to sirup, which is about half the sweetness of molasses; it is then taken out and strained through a flannel cloth, and put into a tub or barrel to cool and settle for 12 hours—(I use a sheet-iron pan set in an arch of brick; the pan is made of Russia iron, eight feet long, four feet wide, and six inches deep;) it is then taken out, and I am careful not to move the bottom where it has settled, and place it in a kettle, and heat it to 98 degrees. I then add (for 100 pounds) the whites of four eggs, two quarts of milk, and one ounce of sal-eratus—the eggs well beat up, and the sal-eratus well dissolved—and stir the whole well together in the sirup; and when the scum has all risen, it is to be taken off, and be sure it does not boil before you have done skimming it. Then it is boiled until it is done, which you will know by dropping some into water; which, if done, will form a wax. It then must be taken from the kettle, and placed in tin pans to cool and form the grain; and, as soon as the grain is sufficiently formed, I then pour it into tunnel-shaped boxes to drain, and, after 24 hours, I place a flannel cloth on the top;

and take the plug from the bottom, and let it drain. The flannel cloth I keep wet from day to day.

The sample which you have seen was done in this way, with the addition of being repeated after once draining. Should you wish for further information, or a more extensive sample, please send me word to that effect, and it will be cheerfully given. You will please accept of my thanks for your kindness.

Yours, &c.

MOSES EAMES.

Hon. H. L. Ellsworth.

No. 15—(3.)

EXHIBITION OF MAPLE SUGAR IN NEW YORK.

The samples of maple sugar surpassed any thing of the kind we have seen; they were as white as loaf sugar. We have samples before us. The process of clarifying this sugar having been communicated to us, and it being both new and important, we give it to our readers. The liquor is strained, and put into sheet-iron pans under a stone arch, and boiled. Into three gallons of sirup stir half a pint of milk and the white of two eggs; then place it in a sheet-iron pan on a stove until it boils. Strain and boil it until it will grain; and then let it stand about six hours before it is drained. This drain is made with four pieces of board, converging to a point; the molasses drains off at the bottom; a wet flannel cloth is kept on the sugar three days. This is the recipe by which the young lady (Miss White, of Delaware county, New York) perfects the process of clarification.

No. 16—(1.)

CORN-STALK SUGAR.

New Harmony, Indiana, *November* 19, 1844.

Sir: You having deemed my communication to the Indiana Statesman worthy a place in your last report to Congress, I am induced to send you some account of my experiment this year in the manufacture of corn-stalk sugar. As I have but little to add to my last year's statement on the growth and manufacture, I shall confine myself principally to a comparison of the product and expense with that of raising corn, our great staple production.

Having but a small farm, and being desirous only of making sugar sufficient for my own use, my experiments will not compete with others who have gone more extensively into the business; but, as regards the results, they are perhaps, in most respects, as conclusive as any other. Should any statement, however, be sent to you more satisfactory, you can cast this aside.

I planted this year three-fourths of an acre, the land being hill-side, and subject to wash. The soil was thin and light, and the crop of stalks was by no means a good one. There were 33 rows in the piece, the average of which yielded 14 lbs. to the row of the crystallizable sirup. This will give for an acre 616 lbs.; and, as I am still inclined to believe that it yielded two-thirds

sugar and one-third molasses, (perhaps more sugar, as I have no means of proving this accurately at present,) I think it would be fair to estimate it at 5 cents per lb., which would give for the acre $30 80. Side by side, in the same field, I had corn. This yielded about 50 bushels to the acre; and estimating this at 16 cents per bushel, its value here in the crib, it would give for the corn $8. The cultivation of each, up to the time of pulling off the ears, is the same: the pulling off the ears I will offset by the pulling off of the corn.

I will now endeavor to estimate the expense of getting the stalks and manufacturing the sugar, and deduct this from the amount above stated; and, after deducting the expense for husking the corn, compare the results:

Blading, cutting, and getting stalks to mill - -		$1 00
One man 11 days, at 50 cents per day - - -		5 50
Horse hauling 2 days, at 25 cents per day - -		50
Grinding: man and horse 5½ days, at 75 cents per day -		4 12½
Boiling 11 days, at 50 cents per day - - -		5 50
Fuel: 2 cords of wood, at $1 per cord - - -		2 00
Interest and repairs on fixtures - - - -		3 00
		21 62½
Value of sirup - - - - - -		30 80
Nett value - - - - - -		9 17½
Balance of corn - - - - -	$8 00	
Husking corn: one man, two days - -	1 00	
		7 00
Balance in favor of sugar experiment - -		2 17½

It will be seen, by a reference to the statement of Mr. Tillotson in your last report, that the cost for blading, grinding, &c., (without allowing any thing for interest and repairs,) was, for four acres, $31, or $7 75 per acre. His allowance for the man, per day, is the same; for the horse, 50 cents. For the horse I have only allowed 25 cents. Throwing out the item for interest, and it would leave the expense per acre $17 62½—more than double the amount of Mr. Tillotson's calculation; showing how much the expense might be reduced on a large scale, and where they have the experience and convenient fixtures.

It will also be seen, by a reference to Mr. Tillotson's statement, that his product was 200 gallons of the sirup for the four acres, or 50 gallons per acre. By dividing my 616 pounds by 12 pounds, (the weight of the gallon of sirup,) it will be seen that my yield was over 51 gallons per acre.

I now propose taking a brief review of the other statements contained in your last report, with such observations on their practices, or my own, as may occur to me.

Mr. Plummer, of Richmond, never could get the thermometer to rise higher than 226°. We never found any difficulty on this head, except in one instance in last year's experiment, when, on examination, it was found to be burnt on the bottom of the kettle; and this was believed to be the cause. In that instance, it would not rise more than 230°; at all other times, we had no difficulty in raising the heat to 236° or 238°.

The next statement is Mr. Deaderick's, of Tennessee. Mr. D. found difficulties in crystallization, and thinks that "the age of the stalks most congenial to the granulating process is when the corn is just becoming too hard for the purpose of cooking." I should think that leaving the ears on this long would be fatal to the richness of the juice, and also probably so to the granulation. I have had no difficulty with the crystallization; it commences in from twelve to forty-eight hours after the boiling has ceased, and the result is somewhere between two-thirds and three-fourths sugar.

The next is Mr. Adams's. Mr. A., after stating his success and his difficulties, sums up by saying "that there are some four or five things that need to be made clear and well established, before complete success will attend our efforts."

1st. The first is the clarifying the juice. I am of the opinion that the lime is not necessary, and perhaps not useful, in the clarification. We have found no difficulty on this head, after a little experience; the only thing that is necessary is to take care to skim off all the impurities as they rise to the surface, before it commences boiling. Should the boiling commence before this is completed, a little of the cold juice thrown in will restore it to its original state, and the process can easily be continued till it is perfectly clear. The lime, I believe, is only necessary to neutralize the acid.

2d. Some means by which crystallization may be more sure and perfect. As I have observed before, I have had no difficulty on this head, and am inclined to believe that there would be none if the boiling is sufficiently rapid, and the temperature raised to 237° or 238°.

3d. The third is noticed in my remarks on the second.

4th. Draining or removing the molasses from the grained sugar. I, like Mr. Adams, have found difficulty here; and can say, with him, when the crystals are well formed, the whole mass seems to be of an adhesive gummy nature, that renders it strongly retentive of its molasses.

5th. A corn-stalk taste to the sugar. The sample sent you is just as the molasses has drained from it. My opinion is, not that it has a corn-stalk taste, but a slightly acid taste; and I think, if it was freed from its molasses, the sugar would not have this taste; the molasses, though clear, and not so dark colored as the Louisiana molasses, has more of this acid taste. Now, it will be seen that the only difficulties with me are the drainage and this acid. Probably the same means will at once remove both these difficulties. Lime is *perhaps* the neutralizer of this acid, and its only use in its manufacture. As I have said before, I do not deem it of any use in the clarification; and, moreover, I have been told that many of the boilers of cane juice do not put in the lime till after the juice is clarified; thereby showing that it is only used as a neutralizer, and the error has most likely been hitherto in not using a sufficient quantity. I used double the quantity this year that I did the year before, with but very little difference in the result; but I used the clear lime water, or simply what the water itself would take up; and I find, on inquiry, that this is a very small portion. Unless some one throws some additional light on this subject, I shall use it in future in another form, and larger quantity.

There is nothing in Mr. Humphrey's communication but what has been already noticed in the preceding remarks, except that I deem all strainings and stoppings to let it settle, after it has once gone to the fire, as not only useless, but detrimental to the process.

Some gentlemen speak of pans for the evaporation, five or six inches

deep. I cannot conceive how it can be boiled with sufficient rapidity in such shallow vessels. I should think they ought to be double or treble the depth. I am told the cane sugar-boilers build up brick work around the tops of their kettles to a considerable height, to prevent the liquor from flowing over.

It has been suggested, that pulling off the tassels would be a better mode, and secure the object in view more easily than pulling off the ears. I made, this year, an experiment to test this; and am satisfied that it cannot be done to any practicable extent. I planted in my garden, about the 15th June, a small patch of corn. I planted it thus late, to insure its not being impregnated by any corn in the neighborhood. As soon as the tassels began to show, they were carefully cut off; and this was done, from day to day, as long as any appeared. On examination, it was found that there was scarcely an ear but had some grains on it, and most of them were from one-fourth to three-fourths filled. I suppose that in one night one tassel might do considerable damage, and thus render all daily care abortive, and totally impracticable for a large piece.

It has also been suggested, that the fodder that is stripped from the stalks would, in some measure, compensate for the operation. Unless the land is sufficiently rich without, I think it would be better to give it to the land. I threw mine into the furrow, and, as soon as I had done, I ploughed a furrow each way on to it, and left it to rot. This will account for my not having made an item of it in the comparison between corn and sugar.

There remains but one thing more to notice, and I have done; that is, the proper time to use the stalks. I have not had as much experience on this subject as I could wish. My principal experience, I should say, has been with stalks rather late. The first that ever I tried (in 1841—a small quantity) was with young stalks: the sirup had grained sugar in it. The same year, some was pressed from stalks grown after the 1st of July: this, also, had grained sugar in it. Both these had somewhat of a corn-stalk taste; though this might arise from its not being properly treated in the first steps of boiling. My two last years, as I have already observed, have been late. Of the last I shall now speak. A severe drought in August hurried on my stalks to maturity before I was ready, and I began to be apprehensive that I should lose them. Having no one but myself and wife, who managed the boiling, it took us twelve days, as we could only press and boil every other day; but the juice and the yield was as good on the last day as on the first, and I believe that it might have been begun a week (or perhaps two) earlier, and continued the same time later, without making any material difference; thus showing that no critical period, as some have suggested, is necessary.

I perhaps owe some apology to the gentlemen on whose communications I have remarked. I can only say that it has been done with a view to arrive at correct conclusions on this subject; and I trust, if they find any thing in mine that does not agree with their own experience, they will make equally free remarks. And if they or others have arrived at any conclusions that have escaped me, I shall also be glad to hear it.

Respectfully,

JOHN BEAL.

Hon. H. L. Ellsworth.

No. 16—(2.)

CORN-STALK SUGAR AND MOLASSES.

To the Editors of the Tennessee State Agriculturist.

ATHENS, *November* 28, 1844.

GENTLEMEN: Believing that the manufacture of corn-stalk sugar and molasses is forthwith susceptible of being made a matter of the greatest importance, it is deemed expedient to enter into details that perhaps will be considered unnecessarily minute by some who are not yet apprized of its great value. For it is certainly true, that, if the necessary care and attention be not bestowed on the whole process, from the first to the last, an inferior article will be the consequence, and which may induce the experimentalist to abandon the business in despair and disgust. Year before last, having met with the essay of Webb on our subject, it was concluded to give this new project a trial, sufficient to enable me to determine whether or not it was capable of being made an object worthy of serious attention. The result was decidedly favorable: and accordingly, last year, a more efficient apparatus was provided, with the intention of making a sufficient quantity of sugar and molasses to exempt me from the necessity of purchasing those articles—no inconsiderable affair, where a large family has to be supplied, at a cost of 12½ cents per pound for the first, and $1 per gallon for the last named article, especially in a part of the country where money is so scarce that it requires profound sagacity, deeply laid and successful stratagem, and vigorous exertion, to obtain a sufficiency to enable one to live decently, and to pay all their dues at a proper time.

The object proposed was, to a great extent, realized; but not being apprized of the quantity that would be necessary to last a whole year, it turned out that we had not made quite enough; our stock becoming exhausted about the middle of April, and from that time until the latter part of July it becoming necessary to resume the purchasing of sugar.

During the last season, however, an ample supply has been made—rather over 100 gallons—equivalent to a hogshead of sugar. This quantity could have been extended to eight or ten barrels, if a sufficient supply of stalks had been provided; for, by planting the corn at various times, the molasses season can be prolonged from the middle of July to the middle of October. Four or five other mills were in operation in this region during the past summer, at which were variously made from 10 to 60 gallons. Now, what has been accomplished by a few individuals can be done by every farmer in the State; and if this should prove to be the case, it is evident that no trivial revolution in its commercial transactions would be the result. Assuredly it is as absurd and unnecessary for a farmer to purchase sugar and molasses, as it would be to import his soft soap, candles, or any other article of ordinary domestic production. The mill should be made with three rollers, at least 20 inches in diameter, and 26 inches long, 4 inches above the cogs, (the cogs 4 inches wide,) and 18 inches below the cogs; the necks ought to be about 3 inches long and 6 inches in diameter, with a smooth iron band fitted on, to prevent their wearing. The stem of the middle roller should be 12 or 13 inches in diameter, and 5 or 6 feet long; the neck to be received in a corresponding hole in a transverse beam, resting on two posts about 25 feet asunder. This arrangement will cause the mill to run more equally than if there was no support above. There should also be

some contrivance of keys and wedges, with which to adjust the outside to the middle roller. This, however, must be left to the ingenuity of the builder of the mill, as it cannot easily be made intelligible on paper.

For the sake of convenience, it may be proper to assign to the corn stalk two stages in its growth, as the most suitable for making molasses and sugar, to wit: 1st. When just in roasting oars. 2d. When it has passed out of roasting-ear stage, and become too hard for cooking, and thence to the commencement of fodder pulling. The sirup made from the stalks during the first or roasting-ear stage, if boiled moderately thick, will very much resemble honey, both in appearance and taste. In the second stage, (which I consider, on the whole, the proper one,) or when the corn has become too hard for cooking, the sirup will more nearly resemble that made from the sugar cane, and is the age of the stalk at which the sirup is most disposed to granulate. As you approach fodder-pulling time, the molasses will become darker, and not so agreeable to the taste. In the first, or roasting-ear stage, it requires 10 gallons of juice to make 1 gallon of sirup. In the second stage, or two weeks later, 8 gallons will do the same. One hundred moderately large stalks will make one gallon of sirup, boiled to the point of granulation; that is, when, on taking a small portion (as warm as it can be borne) between the thumb and fore finger, it can be drawn into a thread an inch or an inch and a half long. One gallon of such sirup is equivalent to ten pounds of brown sugar, for any of the purposes for which that article is commonly used. Stalks from which the ears have been pulled in the embryo state will afford one-fourth more sirup than will those on which the ears have been permitted to arrive at their full growth. Small stalks will yield about the same quantity of juice as large ones; that is, the product of a *given weight* of either will be about the same. Large stalks, however, are preferable to small ones, as it requires nearly as much time to strip and prepare for the mill the latter as the former. As regards the *speedy* granulation of sirup, the same difficulties have been experienced as heretofore.* It is, however, satisfactorily ascertained that, if properly made, and placed in shallow vessels, and in a moderately warm situation, it will granulate, if sufficient time be allowed it for that purpose. Last season a small portion was set aside, and five months elapsed before the crystallization was completed; leaving, however, little or no molasses.

At present, I have parcels which, since last August, have been slowly undergoing the process—some of them now ready for draining; and doubtless, in a few weeks more, the whole will be completed. My apparatus for boiling consists of a large iron kettle, and also one of copper, made from the lower part of a second-hand still, the nozzle being removed, and the aperture closed by a piece of copper riveted on it; an iron band, nearly an inch wide, surrounds the top, and riveted; the edge of the copper being turned over it, a broad lip is formed in front, for the convenience of pouring out the sirup; two ears are welded on the band, in an opposite direction, with holes in them to receive two large rings, for the purpose of lifting it off the furnace; there ought, also, to be one behind. This kettle is about 3 feet in diameter, and nearly 1 in depth, and holds about 35 gallons, and answers admirably, as the boiling can be finished in it about one-third of the time that is required in one of the ordinary depth. A shallow skimmer

* It is evident that superabundant mucilage in the juice prevents the speedy granulation of the sirup; and it is hoped more mature experience will remove this and every other obstacle to complete success.

of tin, about eight inches by six, with holes in the bottom and rounding at the end, fixed in a wooden handle, will be found far more convenient for skimming than the ladle in common use. It will expedite the business if the fodder be stripped off the stalks the evening previous to the morning when they are intended to be cut; and afterwards the whole of the sheaths (or shucks, as they are called) about the joints must be carefully removed, and stalks perfectly clean. It is all-important that the juice be pressed out and set to boiling as speedily as possible after the stalks are cut. Not more than two hours should elapse before this is done; for if the stalks are permitted to lie, or the juice to stand longer than the time mentioned, fermentation will commence, and infallibly injure the quality of the molasses. As soon as a sufficient quantity of juice is received from the mill, it should be allowed to stand a few minutes for the coarser particles to subside, and then strained through a coarse cloth, and a table spoonful and a half of clear lime water added to each gallon of juice, and then poured into the kettle, and carefully watched and skimmed during the whole process of boiling. When iron pots or kettles are used, it is absolutely necessary that they be entirely free from rust, as the smallest portion of this would impart a dark color and ferruginous taste to the sirup, and also a dusky hue to coffee, when used in that way. With the fixtures above mentioned, and one horse, we made seven or eight gallons per day; but, being in no hurry, generally ceased grinding about four o'clock in the afternoon, in order to finish boiling before night. By using two horses, or extending the operations to some time after dark, ten gallons daily could have been easily made. The molasses thus produced has over and again been pronounced, by numerous persons who have partaken of it, to be superior to the imported article; all, without exception, were fond of it; whilst among them were several who reject the use of cane molasses altogether. It may not be amiss here to repeat a remark made in a former communication, to wit: that, when intended to be used in coffee, the preferable and most convenient mode will be to mix it with the coffee when first made, and boil all together. It is probable that the influence of prejudice will, for some time, prevent a general substitution of corn-stalk sugar and molasses for the corresponding article of Louisiana and the West Indies; for there is something repulsive in the idea that a product of common corn stalk (an article with which we have been so familiar from our infancy) should come in competition with a similar one of the far-famed sugar cane, that comes from so great a distance, and costs so much.

In view of the foregoing facts, it appears every way reasonable to believe that, before another year rolls round, a sufficient quantity of sugar and molasses can be made to supply our own wants in that respect. Yes, if every farmer in four or five of our most populous counties would each make only three or four barrels, it would probably amount to a greater quantity than is annually imported into the State. But will this be done? It may well be doubted; for it is a melancholy truth, that, with few exceptions, there does not appear to exist among the farmers of Tennessee (especially those of East Tennessee) a much greater amount of agricultural and manufacturing intelligence, enterprise, and industry, than one might reasonably expect to find in a colony of free negroes.

WILLIAM H. DEADERICK.

P. S. Persons desirous of further information on this subject can find

several interesting communications in relation to it in the last report of Mr. Ellsworth, Commissioner of Patents, amply confirming every thing I have advanced. Indeed, without this additional testimony, I should not have written as confidently as I have done, lest, otherwise, I might perchance be honored with the suspicion of being an enthusiast on the subject.

W. H. D.

No. 16—(3.)

WASHINGTON, *October* 18, 1844.

SIR: I now do myself the pleasure to comply with your request, respecting the manufacture of sugar from the juice of the corn stalk. You say that the liquor extracted from corn stalks gives plenty of saccharine juice, and of a quality nearly equal to that of the cane; but parties experimenting upon it have not been successful in granulating it. This is not unfrequently the case in new districts where the cane has been introduced, and often perplexes some of the old and experienced sugar boilers; but, on mature examination and inquiry, the difficulty has invariably been found to be in the evaporation; and I have no hesitation in saying that such is the case in this instance. On reference to my former letter, (in January last,) you will find that I have detailed to you the method as now practised in the West Indies and Brazils, and, I presume, is similar to the one followed in other sugar countries. You will perceive that I am an advocate for the vacuum pans as the means of evaporation; they not only have established their superiority over all other methods, but they produce a superior quality, as well as an increase in quantity.

As you appear to take considerable interest in this matter, I shall be happy in giving you the use of my filter, as well as my personal attendance, provided a small vacuum pan is used.

I am, sir, respectfully, your obedient servant,

JOHN WATSON.

Hon. H. L. ELLSWORTH.

No. 16—(4.)

BOSTON, *January* 12, 1845.

DEAR SIR: I received your letter, and your last year's report, and also the sample of corn-stalk sugar. I now write to say that I gave the sample of sugar to my friend Richard Soule, jr., and requested him to make an analysis of it, and to send me the results. He has done so; and I now enclose his letter for you, which please make such use of as may answer your purpose. I had formed the opinion that the saccharine matter existed in two different states in the corn stalk, dependent on the degree of ripeness of the plant; which opinion the researches of Mr. Soule have proved to be correct.

The stalks he analyzed last autumn were not ripe enough to give cane or crystallizable sugar. Hence none was obtained, and only glucose or grape sugar was found in the expressed juice.

I consider this discovery one of great practical importance; for it not only serves to explain the numerous failures in making corn sugar, but also indicates that great care must be taken to cut the stalks at the right degree of ripeness, or when cane sugar is formed. I have arranged matters so that next summer we can test this question; and Mr. Soule will continue his researches and experiments on a crop of corn, which will be under his control, so that he may not again be disappointed by the carelessness of the farmers, as he was last year by the cutting up the crop he had reserved for researches.

We ought to have experiments made on all the different varieties of corn, so as to be able to select the most profitable for the sugar culture. The subject is of sufficient importance to come under the patronage of Congress; for if corn-stalk sugar can be made profitably, it will be a matter of no small importance to the Western States.

Is it not desirable to make some experiments on the sugar in the dried corn stalks? It appears to me that much of the mucilaginous matter may be got rid of, by allowing the stalks to dry; and then, by grinding or chopping them up, we might dissolve out the crystallized sugar, and leave much of the foreign matters.

This method has been used in France in separating beet sugar. It will have the advantage of allowing the farmer to suspend his sugar-making until winter, when he has more leisure.

The stalks should be dried as rapidly as possible, to avoid fermentation. The best way would be, to cut out the joints, and to dry the split shafts of the stalks in an oven, or by dry warm air, in a room heated by a stove.

It may also be important that researches be made to ascertain whether it is possible, by a cheap method, to convert grape into a crystallizable or cane sugar.

We know it is one of the most simple experiments, readily performed by the chemist, to convert linen fibre into grape sugar, so that from a pound of rags he can make more than a pound of sugar. He can also readily convert starch into grape sugar by similar processes. Now, is it not possible to carry the process further, and to change the grape sugar into cane sugar?

Most respectfully, your obedient servant,

CHARLES T. JACKSON.

Hon. Henry L. Ellsworth.

No. 16—(5.)

East Boston, *January* 10, 1845.

Dear Sir: I have had time to make only a partial examination of the specimen of corn-stalk sugar which you were so kind as to send me a few days since; but this was in reference to what is most important to be known about it—namely: the amount uncrystallizable sugar which it contains, as compared with raw sugar produced from the cane.

To ascer ain this poin made use of what is called the copper test, or

a potassic solution of tartrate of copper, which has the remarkable property of yielding a precipitate of protoxide of copper to a boiling solution of grape sugar, while it remains entirely unaffected by a similar solution of crystallizable or pure cane sugar. So that, from the quantity of protoxide precipitated when the test is added to boiling solutions of any two samples of sugar, we may judge of their relative value.

For the purpose of comparison in the present instance, I selected some Cuba sugar of the same external appearance, in respect of color and granular texture, as that of the sample you sent. I brought both to the same degree of dryness, as near as could be ascertained, and then weighed out 50 grains from each parcel. These two portions were dissolved in separate capsules, with a large proportion of water, and heated to the boiling point. At this stage, the test was added. A precipitate was immediately produced in each of the capsules.

These were allowed to stand at rest over night, and the next day the superincumbent solutions were carefully decanted. The precipitates were afterwards repeatedly washed with hot water, till all traces of foreign matters were removed, when they were put into the drying stove of our refinery. When perfectly dry, the capsules, with their contents, were weighed; and after washing out the latter, the capsules were replaced in the scale. The difference of weight in each case was, of course, that of the precipitate; and was found to be exactly two grains for both samples. I conclude, therefore, that this specimen of corn-stalk sugar is quite equal in value to Cuba sugar of the same shade of color.

It would appear, from the reports of many experiments made on the juice of corn stalks, that while, in some cases, it has been made to crystallize with considerable facility, in the greater number of cases it has either yielded no crystals at all, or has been brought to a state of concretion, rather than crystallization. I am of opinion that these different results are to be ascribed to the fact that the stalks which afforded the juices used in these several trials were in different states as respects ripeness.

It is probable that, at one period in the growth of the stalk, all the saccharine matter which it contains is nothing but grape sugar, and that this passes gradually to the state of cane sugar during the progressive development of the plant. If, therefore, the stalk is cut too early, no degree of care in clarifying and boiling the juice will enable the operator to bring it to a crystalline state. It is important, too, I imagine, that *all* the stalks should be sufficiently ripe; for if any considerable quantity should be below the proper degree of ripeness, their juice, when mingled and boiled with that of the stalks which have reached that degree, will act as a leaven in reconverting to grape sugar the crystallizable sugar of the latter.

The great desideratum, then, in this matter of corn-stalk sugar, I believe to be to ascertain, more precisely than has yet been done, what is the most suitable treatment for the stalks in the successive periods of their growth, and when is the best time to cut them.

That good sugar can be made from corn stalks, there is no doubt; but there is as little doubt that good sugar is not always, and not often, produced from them when the attempt is made. Let some one tell us how the experiment may always be successful, and then we shall be better prepared to

decide whether it will be an economical use of a portion of our soil to devote it to the culture of corn stalks for this purpose.

Very respectfully, your obedient servant,

RICHARD SOULE, Jr.

Dr. Charles T. Jackson.

No. 17.

SUGAR OF POTATOES, GRAPES, AND STARCH.

From Dr. Ure's Dictionary.

About two years ago, a sample of sweet mucilaginous liquid was sent to me, for analysis, by the honorable the commissioners of customs. It was part of a quantity imported in casks at Hull from Rotterdam. It was called by the importers "vegetable juice." I found it to be imperfectly saccharified starch, or fecula; and, on my reporting it as such, it was admitted at a moderate rate of duty.

Three months since, I received a sample of a similar liquid from the importer at Hull, with a request that I would examine it chemically. He informed me that an importation just made by him of 30 casks of it had been detained, by order of the excise, till the sugar duty of 25*s.* per cwt. of solid matter it contained was paid upon it. It was of specific gravity 1.362, and contained 80 per cent. of ill-saccharified fecula.

In the interval between the first importation and the second, an act of Parliament had been obtained for placing every kind of sugar, from whatever material it was formed, under the provisions of the "beet-root sugar bill." As the saccharometer tables (subservient to the laying of the excise duties under this act) were constructed by me, at the request of the president of the board of trade, I well knew that 50 per cent. of the sirup of the beet root was deducted as a waste product, because beet root molasses is too crude an article for the use of man. Well saccharified starch paste, however, constitutes a sirup—poor, indeed, in sweetness, when compared with cane sirup, or that of the beet root; but then it does not spontaneously blacken into molasses by evaporation, as solutions of ordinary sugar never fail to do when they are concentrated even with great care. Hence the residuary sirups of saccharified fecula may all be worked up into a tolerably white granular mass, which, being crushed, is used by greedy grocers to mix with their dark brown bastard sugars, to improve their color.

It is only within two years that sugar has been in this country manufactured from potato starch to any extent, though it has long been an object of commercial enterprise in France, Belgium, and Holland, where the large coarse potatoes are used for this purpose. The raw material must be very cheap there, as well as the labor; for potato starch, or flour, for conversion into sugar, has been imported from the continent into this country in large quantities, and sold in London at the low price of 10*s.* per cwt.

The process usually followed by the potato sugar makers, is, to mix 100 gallons of boiling water with every 112 lbs. of the fecula, and 2 lbs. of the strongest sulphuric acid. This mixture is boiled about 12 hours in a large vat made of white deal, having pipes laid along the bottom, which are con-

nected with a high-pressure steam boiler. After being thus saccharified, the acid liquid is neutralized with chalk, filtered, and then evaporated to the density of about 1.300 at the boiling temperature, or exactly 1.342 when cooled to 60°. When sirup of this density is left in repose for some days, it concretes altogether into crystalline tufts, and forms an apparently dry solid of specific gravity 1.39. When this is exposed to the heat of 220°, it fuses into a liquid nearly as thin as water. On cooling to 150°, it takes the consistence of honey; and at 100° Fahrenheit it has that of a viscid varnish. It must be left a considerable time at rest before it recovers its granular state. When heated to 270°, it boils briskly, and gives off one-tenth of its weight of water, and concretes, on cooling, into a bright yellow, brittle, but very deliquescent mass, like barley sugar. If the sirup be concentrated to a much greater density than 1.340, (as to 1.362,) or if it be left faintly acidulous—in either case it will not granulate, but will remain either a viscid magna, or become a concrete mass—which may indeed be pulverized, though it is so deliquescent as to be unfit for the adulteration of raw sugar. The Hull juice is in this predicament, and is therefore, in my opinion, hardly amenable to the new sugar law, as it cannot by an means be worked up into even the semblance of sugar.

Good muscovado sugar from Jamaica fuses only when heated to 280°; but it turns immediately dark brown, from the disengagement of some of its carbon at that temperature, and becomes, in fact, the substace called "caramel" by the French, which is used for coloring brandies, white wines, and liquors.

Thus we see that starch or grape sugar is well distinguished from cane sugar, by its fusibility at a moderate heat, and its inalterability at a pretty high heat. Its sweetening power is only two-fifths that of ordinary sugar. A good criterion of incompletely formed starch sugar is its resisting the action of sulphuric acid, while perfectly saccharified starch or cane sugar is readily decomposed by it. If to a strong solution of imperfectly saccharified grape sugar, nearly boiling hot, one drop of strong sulphuric acid be let fall, no perceptible change will ensue; but if the acid be dropped into solutions of either of the two other sugars, black carbonaceous particles will make their appearance.

The article which was lately detained by the excise for the high duties at Hull is not affected by sulphuric acid, like the solutions of cane sugar, and of the well-made potato sugar of London; and, for this reason, I gave my opinion in favor of admitting the (so called) vegetable juice at a moderate rate of duty.

I subjected the solid matter obtained by evaporating the Hull juice to ultimate analysis by peroxide of copper in a combustion tube, with all the requisite precautions, and obtained in one experiment 37 per cent. of carbon, and in another 38 per cent., when the substance had been dried in an air bath heated to 275°. The difference to 100 is hydrogen and oxygen in the proportions to form water. Now, this is nearly the constitution of starch. Cane sugar contains about 5 per cent. more carbon, whereby it readily evolves this black element, by the action of heat or sulphuric acid.

An ingenious memoir, by Mr. Trommer, upon the distinguishing criteria of gum dextrine grape sugar and cane sugar, has been published in the 39th volume of the "Annalen der Chemie und Pharmacie." I have re-

peated his experiments, and find them to give correct results when modified in a certain way. His general plan is to expose the hydrate of copper to the action of solutions of the above-mentioned vegetable products. He first renders the solution alkaline; then adds solution of sulphate of copper to it; and either heats the mixture, or leaves it for some time in the cold. By pursuing his directions, I encountered contradictory results; but, by the following method, I have secured uniform success in applying the criteria, and have even arrived at a method of determining, by a direct test, the quantity of sugar in diabetic urine.

I dissolve a weighed portion of sulphate of copper in a measured quantity of water, and make the solution *faintly* alkaline, as tested with turmeric paper, by the addition of potash lye in the cold; for, if the mixture be hot, a portion of the disengaged green hydrate of copper is converted into black oxide. This mixture, being always agitated before applying it, forms the test liquor.

If a few drops of it be introduced into a solution of gum, no change ensues in the hydrate of copper, even at the boiling heat; which shows that a gummate of copper is formed, which resists decomposition. But the cupreous mixture without the gum is rapidly blackened at the boiling temperature. I do not find that the gummate is re-dissolved by an excess of water, as Trommer asserts.

Starch and tragacanth compost like gum; in which respect I agree with Trommer. Starch, however, is already a perfect criterion in iodine water. Mr. Trommer says that solution of dextrine affords a deep blue colored liquid, without a trace of precipitate; and that, when his mixture is heated to 85° C., it deposites red grains of protoxide of copper, soluble in muriatic acid. I think these phenomena are dependent, in some measure, upon the degree of alkaline excess in the mixture. I find that solution of dextrine, treated in my way, hardly changes in the cold; but when heated slightly, it becomes green; and, by brisk boiling, an olive tint is produced. It thus betrays a tendency of transition into sugar.

Solution of cane sugar, similarly treated, undergoes no change in the cold at the end of two days; and very little change of color, even at a boiling heat, if not too concentrated. Cane sugar, treated by Trommer in his way, becomes of a deep blue; it can be boiled with potash in excess, without any separation of orange-red oxide of copper.

Starch or grape sugar has a marvellous power of reducing the green hydrate of copper to the orange oxide. I find, however, that it will not act upon the pure blue hydrate, even when recently precipitated; it needs the addition, in every case, of a small portion of alkali. Yet ammonia does not seem to serve the purpose; for, in using the ammonia sulphate of copper in solution, I obtained unsatisfactory results with the above vegetable products. The black oxide of copper is not affected by being boiled in solution of starch sugar.

"If solution of grape sugar" (says Trommer) "and potash be treated with a solution of sulphate of copper, till the separated hydrate is re-dissolved, a precipitate of red oxide will soon take place at a common temperature, but it immediately forms if the mixture is heated. A liquid containing a hundred thousandth of grape sugar, even one millionth part," says he, "gives a perceptible tinge (orange) if the light is let fall upon it." To obtain such a minute result, very great nicety must be used in the dose of alkali, which I have found it extremely difficult to hit. With my regulat-

ed alkaline mixture, however, I never fail in discovering an exceedingly small portion of starch sugar, even when mixed with muscovado sugar; and thus an excellent method is afforded of detecting the frauds of the grocers.

I find that manna deoxidizes the green hydrate of copper slowly when heated, but not nearly to the same extent as grape sugar, which reduces it rapidly to the orange oxide. If an excess of the hydrate of copper test be used, there will be a deposite of green hydrate at the bottom of the vessel, under the orange oxide.

To apply these researches to the sugar of diabetic urine: this should first be boiled briskly, to decompose the urea, and to dissipate its elements in the form of an ammonia, as well as to concentrate the saccharine matter, whereby the test becomes more efficacious; then add to the boiling urine, in a few drops at a time, the cupreous mixture, containing a known quantity of sulphate of copper, till the whole assumes a greenish tint, and continue the heat until the color becomes bright orange. Should it remain green, it is a proof that more hydrate of copper has been introduced than has been equivalent to the deoxidizing power of the starch sugar. I have found that one grain of sulphate of copper in solution, supersaturated very slightly with potash, is decomposed with the production of orange protoxide by about 3 grains of potato sugar; or, more exactly, 30 parts of the said sulphate, in the state of an alkaline hydrate of copper, pass altogether into the state of orange oxide, by means of 100 parts of granular starch sugar. Thus, for every 3 grains of sulphate so changed, 10 grains of sugar may be estimated to exist in diabetic urine.

Acetate of copper may be used in the above experiments, but it is not so good as the sulphate. The chloride of copper does not answer.

Specific gravity is also an important criterion applied to sugars. That of the cane and beet root is 1.577; that of starch sugar, in crystalline tufts, is 1.39, or perhaps 1.40, as it varies but a little with its state of dryness. At 1.342, sirup of the cane contains 70 per cent. of sugar. At the same density, sirup of starch contains 75½ per cent. of concrete matter dried at 260 degrees Fahrenheit, and therefore freed from the 10 per cent. of water which it contains in the granular state. Thus another distinction is obtained between the two sugars, in the relative densities of their solutions at like saccharine contents per cent.

No. 18—(1.)

ON THE CULTIVATION OF DYERS' MADDER AS AN ARTICLE OF AMERICAN AGRICULTURE—By M. B. Batcham.

(Rubia Tinctoria.)

The quantity of madder consumed annually in the United States, and imported from abroad, is perfectly astonishing to those who have given no attention to the subject. Unfortunately, our public records do not give very exact information on the subject. Mr. Ellsworth, as the nearest approximation he could obtain, gives the amount of 5,000 tons. Estimating this at the low average price of ten cents per pound, it makes the round sum of *one million of dollars,* paid annually to foreign countries for an

article that can be produced as good and cheap at home—paid, too, by a people loaded down with indebtedness, and disgraced by the forfeiture of plighted obligations.

The cultivation of madder has heretofore been represented as a tedious and laborious operation, requiring much care and skill, as well as outlay of capital. The directions have been mainly gathered from foreign works, detailing the methods practised by the plodding Dutch in Holland and Germany. These accounts have appeared so frightful to Americans, that none of them have dared to undertake the business; and Yankee enterprise and labor-saving ingenuity have never been exercised upon it.

It is true, the crop requires three or four years to arrive at maturity, and needs considerable labor and some knowledge; but the quantity of land it occupies, and the amount of labor it requires, are far less, in proportion to the value of the crop, than those of any other farm crop that can be named.

These assertions are fully corroborated by the experience of an enterprising American farmer, Mr. Joseph Swift, of Erie county, Ohio, who has been engaged in the cultivation of madder for five years past. A detailed account of Mr. Swift's mode of culture, and its results, was obtained at his residence last winter, by the writer of this essay, and published in the New Genesee Farmer for March, 1843.

From this account, it will be seen that, after having informed himself on the subject, and becoming satisfied that the business was practicable and profitable, he at once planted nine acres—a quantity that would astonish Mynheer Van Hollander. This he allowed to grow four seasons, and the crop was harvested and sold in the fall of 1842. The following are some of the results of his experience.

The *product* of the best land was at the rate of 2,000 lbs. per acre; and he is certain that, with his present knowledge, he can obtain 3,000 lbs. per acre; which is more than the best average crops of Holland or Germany. The quality was superior to the average of imported madder.

The labor required, including the whole time, with the digging, cleaning, threshing, &c., was from eighty to one hundred days' work per acre. The outlay, for buildings, fixtures, &c., did not exceed fifty dollars.

The value of the crop was at the rate of fifteen cents per pound, at which price he sold most of it; notwithstanding the circumstance of its being unknown to purchasers, and all the prejudice that usually exists in such cases.

The result, then, in figures, fairly stated, stands thus, for an acre of good land properly managed:

By 2,000 lbs. of madder, at 15 cents per lb. - - -		$300 00
Contra.—To 100 days' work, mostly boys, at 75 cents per day - - - - - -	$75 00	
Use of land 4 years, at $4 per year - - -	16 00	
Grinding, packing, &c. - - - -	9 00	
		100 00
Leaving a nett profit per acre of - - - -		200 00

Mr. Swift was one of the earliest settlers of that section of the country, having resided nearly thirty years on the farm he now occupies, which consists of about 400 acres of choice land, mostly alluvial, in the valley of

the Vermilion river, seven miles from Lake Erie. At my request, he furnished me with the following practical directions for the cultivation of madder, which, he remarked, must be understood as intended for those who wish to cultivate only a few acres, and cannot afford much outlay of capital. Those who wish to engage in the business on an extensive scale, would need to adopt a somewhat different practice.

Soil and preparation.—The soil should be a deep, rich, sandy loam, free from weeds, roots, stones, &c., and containing a good proportion of vegetable earth. Alluvial "bottom" land is the most suitable, but it must not be wet. If old upland is used, it should receive a heavy coating of vegetable earth, from decayed wood and leaves. The land should be ploughed very deep in the fall, and early in the spring apply about one hundred loads of well-rotted manure per acre, spread evenly and ploughed in deeply; then harrow till quite fine and free from lumps. Next plough the field into beds four feet wide, leaving alleys between three feet wide; then harrow the beds with a fine light harrow, or rake them by hand, so as to have them smooth and even with the alleys; they are then ready for planting.

Preparing sets and planting.—Madder sets, or seed roots, are best selected when the crop is dug in the fall. The horizontal uppermost roots, with eyes, are the kind to be used; these should be separated from the bottom roots, and buried in sand in a cellar or pit. If not done in the fall, the sets may be dug early in the spring, before they begin to sprout. They should be cut or broken into pieces containing from two to five eyes each, *i. e.* three or four inches long. The time for planting is as early in spring as the ground can be got in good order and severe frosts are over, which in this climate is usually about the middle of April. With the beds prepared as directed, stretch a line lengthwise the bed, and with the corner of a hoe make a drill two inches deep along each edge and down the middle, so as to give three rows to each bed, about two feet apart. Into these drills drop the sets, ten inches apart, covering them two inches deep. Eight or ten bushels of sets are requisite for an acre.

After culture.—As soon as the madder plants can be seen, the ground should be carefully hoed, so as to destroy the weeds, and not injure the plants; and the hoeing and weeding must be repeated as often as weeds make their appearance. If any of the sets have failed to grow, the vacancies should be filled by taking up parts of the strongest roots, and transplanting them. This is best done in June. As soon as the madder plants are ten or twelve inches high, the tops are to be bent down to the surface of the ground, and all except the tip end covered with earth shovelled from the middle of the alleys. Bend the shoots outward and inward in every direction, so as in time to fill all the vacant space in the beds, and about one foot on each side. After the first time covering, repeat the weeding when necessary, and run a single horse plough through the alleys several times, to keep the earth clean and mellow. As soon as the plants again become ten or twelve inches high, bend down and cover them as before; repeating the operation as often as necessary, which is commonly three times the first season. The last time may be as late as September, or later if no frosts occur. By covering the tops in this manner, they change to roots, and the design is to fill the ground as full of roots as possible. When the vacant spaces are all full, there will be but little chance for weeds to grow; but all that appear must be pulled out.

The second year.—Keep the beds free from weeds, plough the alleys, and cover the tops, as before directed, two or three times during the season. The alleys will now form deep and narrow ditches; and if it becomes difficult to obtain good earth for covering the tops, that operation may be omitted after the second time this season. Care should be taken in covering the tops to keep the edges of the beds as high as the middle; otherwise the water from heavy showers will run off, and the crop suffer from drought.

The third year.—Very little labor or attention is required. The plants will now cover the whole ground. If any weeds are seen, they must be pulled out; otherwise, their roots will cause trouble when harvesting the madder. The crop is sometimes dug the third year; and if the soil and cultivation have been good, and the seasons warm and favorable, the madder will be of good quality; but generally it is much better in quality, and more in quantity, when left until the fourth year.

Digging and harvesting.—This should be done between the 20th of August and the 20th of September. Take a sharp shovel, or shovels, and cut off and remove the tops within half an inch of the surface of the earth; then take a plough of the largest size, with a sharp coulter and a double team, and plough a furrow outward, beam deep, around the edge of the bed; stir the earth with forks, and carefully pick out all the roots, removing the earth from the bottom of the furrow; then plough another furrow, beam deep, as before, and pick over and remove the earth in the same manner; thus proceeding till the whole is completed.

Washing and drying.—As soon as possible after digging, take the roots to some running stream to be washed. If there is no running stream convenient, it can be done at a pump. Take large round sieves, two and a half or three feet in diameter, with the wire about as fine as wheat sieves; or, if these cannot be had, get from a hardware store sufficient screen wire of the right fineness, and make frames or boxes about two and a half feet long and the width of the wire; on the bottom of which nail the wire. In these sieves, or boxes, put half a bushel of roots at a time, and stir them about in the water, pulling the bunches apart so as to wash them clean; then, having a platform at hand, lay them on it to dry. To make a platform, take two or three common boards, so as to be about four feet in width, and nail cleets across the under side. On these spread the roots about two inches thick, for drying in the sun. Carry the platforms to a convenient place, not far from the house, and place them side by side, in rows east and west, and their ends north and south, leaving room to walk between the rows. Elevate the south ends of the platforms about eighteen inches, and the north ends about six inches from the ground, putting poles or sticks to support them. This will greatly facilitate the drying. After the second or third day's drying, the madder must be protected from the dews at night, and from rain, by placing the platforms one upon another to a convenient height, and covering the uppermost one with boards. Spread them out again in the morning, or as soon as the danger is over. Five or six days of ordinarily fine weather will dry the madder sufficiently, when it may be put away till it is convenient to kiln-dry and grind it.

Kiln-drying.—The size and mode of constructing the kiln may be varied to suit circumstances. The following is a very cheap plan, and sufficient to dry one ton of roots at a time. Place four strong posts in the ground, twelve feet apart one way and eighteen the other; the front two 14 feet high and the others 18. Put girths across the bottom, middle, and top, and

nail boards perpendicularly on the outside, as for a common barn. The boards must be well seasoned, and all cracks or holes should be plastered or otherwise stopped up. Make a shed roof of common boards. In the inside, put upright standards, about five feet apart, with cross pieces, to support the scaffolding. The first cross piece is to be four feet from the floor, the next two feet higher, and so on to the top. On these cross pieces lay small poles, about six feet long and two inches thick, four or five inches apart. On these scaffolds the madder is to be spread nine inches thick. A floor is laid at the bottom, to keep all dry and clean. When the kiln is filled, take six or eight small kettles, or hand furnaces, and place them four or five feet apart on the floor, (first securing it from fire with bricks or stones,) and make fires in them with charcoal, being careful not to make any of the fires so large as to scorch the madder over them. A person must be in constant attendance, to watch and replenish the fires. The heat will ascend through the whole, and in ten or twelve hours it will all be sufficiently dried, which is known by its becoming brittle like pipe stems.

Breaking and grinding.—Immediately after being dried, the madder must be taken to the barn, and threshed with flails, or broken by machinery, (a mill might easily be constructed for this purpose,) so that it will feed in a common grist mill. If it is not broken and ground immediately, it will gather dampness, so as to prevent its grinding freely. Any common grist mill can grind madder properly. When ground finely, it is fit for use, and may be packed in barrels, like flour, for market.

Amount and value of product, &c.—Mr. Swift measured off a part of his ground, and carefully weighed the product when dried, which he found to be over 2,000 pounds per acre, notwithstanding the seasons were mostly very dry and unfavorable. With his present knowledge of the business, he is confident that he can obtain at least 3,000 pounds per acre, which is said to be more than is often obtained in Germany. The whole amount of labor he estimates at from 80 to 100 days' work per acre. The value of the crop, at the usual wholesale price, (about 15 cents per pound,) is from $300 to $400. In foreign countries, it is customary to make several qualities of madder, which is done by sorting the roots; but as only one quality is required for the Western market, Mr. Swift makes but one, and that is found superior to most of the imported, and finds a ready sale.

If any person desires instruction for making several qualities of madder, or further information respecting any other point, it may be obtained by addressing, post paid, Joseph Swift, Birmingham, Erie county, Ohio.

No. 18—(2.)

Extract from the report to the French Academy of Sciences, made by M. de Gasparin, Peer of France, member of the Institute, and formerly Minister of the Home Department, on the cultivation of the madder root.

In the cultivation of the madder root, the mineral composition of the soil is almost unimportant, although it has been remarked that it succeeds bet-

ter in those soils in which the proportion of humus,* or vegetable mould, is the greatest. As to the physical properties, the most superior soil for the growth of the madder root is that which is specifically the lightest in proportion to its bulk; that which will take up most water, and in which evaporation is the slowest; that which adheres the least to the tools in working it, and which, being dry, adheres least together. There are two ways of cultivating the madder root: 1st. Cultivation on the small scale, which is done by hand, and on small patches of ground; 2d. Cultivation on the large scale.

Cultivation on the small scale.—When a person has a piece of ground which is suitable to the growth of madder, he should first of all break it up to the depth of a metre,† unless it should lately have been worked to some depth. This is generally done by the spade. The operation should take place during the winter; the rain and frost break up the clods, which, on the approach of spring, will become pulverized. It should be done when the ground is in such a state that, although there is sufficient humidity in it, it will not adhere to the implements made use of. Manure should be carted upon it during the whole winter. There are some lands upon which the quantity of manure to be employed might (as we may say) be unlimited, and they would produce a crop of roots in proportion to the quantity thrown on; but it must be understood that it is only upon porous, light, fresh soils, that the experiment of putting on such a superabundant quantity of manure should be attempted. When the manure has been well spread over the ground, it must be ploughed in crosswise, so as to cover it lightly, and then harrowed, to make the surface even.

The furrows in which the madder seeds are to be sown are then traced out with a small hand plough. The furrows ought to be five feet and a half in width, with a space between them of about fourteen inches; thus the lines would be traced at six feet eight inches distance from each other. This operation being completed, a man takes a hand-furrow, and hollows out a deeper furrow along each ridge; he is followed by a woman or child, who throws the seed into the furrow. From 400 to 450 pounds of seed to every hectare ‡ will be the necessary quantity. The seeds should be regularly distributed, at not more than one and a half inch distance from each other, and in every direction; they should not be sown in lines. When the man has completed his furrow, he will, on returning, open another alongside of it—the earth turned up for which will serve to cover the seed which has been sown upon the first; the woman still follows him, and sows the seed in the new furrow; and so on, till they come to the sixth, which remains without being sown, and which forms the interval between the first and second ridges.

As soon as the madder makes its appearance above the ground, immediate care should be taken to have it properly weeded, in which the agriculturist cannot be too particular; and this must be repeated whenever fresh weeds begin to show themselves. This weeding is to be done by hand. The women and children must go on their knees, in the space between the furrows, and pluck out with great care the roots and filaments of every weed. This should be followed, in every instance, by covering the

* Woody fibre, in a state of decay, is the substance called humus.—(See Liebig's Agricultural Chemistry, chap. 3; published by J. Winchester, New York.)

† A metre is 39¾ inches, English.

‡ A hectare is 2 acres 1 rood and 35 perches, English; or 11,960 square rods.

madder plants with a light layer of earth, taken from between the furrows; and this is for the purpose of making the ground firm around them, and to replace that which the pulling up of the weeds may have removed. The weeding must be repeated more or less often, in proportion to the propensity of the ground to produce weeds; and one ought to calculate upon three weedings being sufficient during the first summer. It will require equal to 22 days' work of a woman upon each hectare, every time it is done, upon such lands as produce weeds only in moderate quantities; but the quantity may be much more considerable in soils where vegetation is particularly vigorous. In the month of September, the furrows should be covered two or three inches deep with earth; and in this state the madder passes the winter. At the time the top of the plant will have begun to wither from the effects of the cold nights, and will soon after become dry, the question is not so much to defend it from the frost, which it withstands well, as to oblige the plant to form new roots in the earth with which it is covered, to the end that it may show itself above ground. The first vegetation in the spring is so vigorous, that it pierces through the layer with rapidity, and the new stem shows itself as soon as the first warmth of spring is felt. During the second year the weeding must be continued; but if it has been carefully done during the first, the madder plants, having taken firm hold of the soil, would not allow the growth of many extraneous weeds. The plants are lightly earthed up after every weeding, as before. However, there are many persons who do not take this precaution after the first year, pretending, with some show of reason, that the pulling up of the weeds cannot affect the madder plants, which then have become firmly rooted. When the stem is in flower, it is cut for fodder, or it is left to run to seed. Opinions are divided as to these two methods. Many persons think that the mowing compels the plant to push forth a new shoot, which impoverishes the root; but, on the other hand, it may be argued that allowing the stem to come to maturity will impoverish the plant, and rob it of all its succulency.

As to the fodder, it is of an excellent quality—almost as much esteemed as lucerne. It is well known that it has the property of turning red the bones of animals which feed upon it—a circumstance often remarked in countries where the madder grows.

Experienced cultivators can judge from the produce of the first year's fodder what will be the produce of the roots themselves; for it has been found that they are equal in weight to the fodder cut the first year, and double that of the second.

The third year does not require any other labor than the mowing of the stems; and finally, in the month of August or September, as soon as the rains have sufficiently penetrated the ground so as to render it easy to be worked, the taking up of the roots themselves is proceeded in. It is necessary that this should be completed before any fears can be entertained of frost, which might prove very injurious to the quality of the roots while they are laid out to dry. To do this, men are placed on every furrow; and sometimes two on each, if the ground be very stiff, and require much labor. With their spades they turn up the ground before them, and keep digging down as long as they perceive any filaments of the roots. Before each laborer is placed a cloth, into which he throws the madder as he gathers it. Whenever this is full, it is carried to the area upon which the crop is to be

spread, for the purpose of drying it; it is turned over with a pitchfork, to clear it from the earth and dust which may adhere to it. It is then conveyed to some dry place, for humidity would render it liable to become mouldy, and would completely deteriorate its quality. After that, all that is necessary is to pack it up for market.

Statement of the expenses for a hectare (about two and a half acres) of madder land, cultivated by spade labor, in the department of Vaucluse.

First year.—For breaking up the ground, 44 days' labor in the winter, and 20 loads of manure; ploughing up two furrows to cover the manure, and harrowing the land; 450 lbs. of seed per hectare; 8 days' work of a man and woman in sowing; weeding three times, 66 days' work of a woman; earthing up three times, 15 days' work of a man.

Second year.—Weeding, in all, 22 days; earthing up once; earthing up for the winter.

Third year.—Taking up the roots, 166 days' work of men and women.

Produce.—Fodder obtained the first year, 8,600 lbs.; second year, 4,300 lbs.; madder roots, 8,600 lbs.

Cultivation on a large scale.—In the cultivation on a large scale, no manure is employed. The first work of breaking up the earth is done with a strong plough; all the other labor of the intermediate years is done by hand, as in the small cultivation. The work of turning up the roots is done also with a strong plough, the mould-board of which is more turned up than usual, to prevent the earth from falling back into the furrow; its handle is of wood, but all the rest of wrought iron. It is constructed altogether upon the principle of the plough called *contrier*. There are, however, two small wheels attached to it, as a sort of fore-carriage, to render its progress more steady. The agriculturist should take care to have a double set of the principal parts of the plough, to prevent delays in case of accident.

To this plough is generally first yoked a pair of oxen, and before them are placed as many horses as the tenacity of the ground may require. The calculation is generally made for six pairs of horses, beside the oxen, for lands of ordinary stiffness. With these means, about half a hectare may be ploughed in a day. The ground should be opened to the depth of about twenty inches.

When such a considerable strength in cattle cannot be obtained, the furrows must be ploughed over twice; and in this way it may be managed with three pairs of cattle, which would do the same work, but take double the time to perform it.

To take up the roots, 20 men and women would be required to each plough, when the madder is not very thick, as is usually the case in the compact soils of which we are speaking.

If the crop prove very good, it would be necessary to increase, proportionately, the number of women to be employed. The width of the field is divided into twenty equal distances, by means of stakes driven in; one man and one woman are appointed to each of these divisions. The men have each an iron rake, and they spread the earth, as it is turned over by the plough, along their division. The women gather up the roots in baskets, and then deposite them in cloths, which are placed at equal distances. The other operations are performed in the manner stated in the preceding article.

Statement of expenses for a hectare of madder land, cultivated on a large scale.

First year.—Breaking up of the land, 2 days' work for 7 pairs of cattle; 6 days' work of men who drive the plough and attend the cattle; cross-ploughing after winter; 450 lbs. of seed; sowing after the plough; weeding; earthing up three times, and for the winter.

Second year.—Earthing up once, for the winter.

Third year.—Ploughing up the roots, 2 days' work for 7 pairs of cattle; 46 days' work for men, and 40 for women, drying and picking up.

Produce.—Fodder obtained the first year, 5,625 lbs.; second, 2,812 lbs.; madder roots, 5,625 lbs.

MADDER SEED.

The very high prices which the madder dyes of France and Holland have attained are sufficient to excite the attention of our intelligent agriculturists. It is only necessary to take into consideration the immense quantity of madder consumed in the various manufactories of the United States, to be convinced that the cultivation of this plant would be attended with great advantages, and that it may be undertaken with certainty of profit.

The madder root can be cultivated in almost every climate. The sands of Silesia, the marshes of Zealand, the arid soils of the south of France and Persia, produce it, and of almost equally good quality. It is well known that atmospheric influences make but little impression upon a root, the valuable part of which grows beneath the surface of the soil; and what a powerful guaranty does this circumstance afford to the cultivator of the madder. It protects him from all varieties of temperature which so frequently destroy crops of a different nature. For those who cultivate the root, a crop is assured as soon as the seed which they have put into the ground begins to germinate.

A special report upon the cultivation of this plant was laid before the Academy of Sciences at Paris, and a prize awarded to the author. It was written by M. de Gasparin, Peer of France, member of the Institute, and formerly Minister of the Interior. The above extract is made from it, which is itself sufficient to instruct all who wish to direct their attention to this new branch of cultivation in this country. French madder seed, obtained from last year's crops, may be had of the subscribers, who have received a consignment of a considerable quantity.

J. M. THORBURN & Co.,
15 John street, New York.

No. 18—(3.)

CULTIVATION OF MADDER.—No. 1.

For the American Agriculturist.

The great depression in every kind of agricultural produce makes it the duty of patriotic citizens to point out any new vegetable products wanting

in the practical arts. Of these, there are some five or six, hitherto imported from foreign countries, that can just as well be grown by our farmers as by foreigners. These are madder, indigo, Sicilian sumach, (*rhus coriaria*,) Italian sumach, (*rhus cotinus*,) weld, (*reseda lutiola*,) and woad.

I undertook to bring these articles to the attention of our agriculturists some fifteen years since, but the then high price of produce paralyzed the effort. I will again bring them to their notice, and, I hope, with better effect. Gibson quotes a wise maxim from the Zendavesta: "He who sows the ground with care and diligence acquires a greater stock of religious merit than he could gain by a repetition of ten thousand prayers."

I shall, in this article, treat of the cultivation of madder. The consumption of it is very large, and would require many thousands of acres to supply the home market. I believe the cultivation of madder has been successfully prosecuted, on a small scale, in the neighborhood of Utica, State of New York, for some years past. About the year 1816, I bought some dried roots in the market of Cynthiana, Kentucky, that I found of very good quality. I have tested some roots brought from South America, where, I am informed, it grows wild, and it proved superior to any European madder I ever used. Mrs. Madison made a report to the Philosophical Society of Philadelphia, many years since, on madder raised under her direction; and the report was accompanied with a sample of cotton dyed an Adrianople red, that has never been exceeded in color by any European dyer.

D'Ambourgue informs us that the roots taken from the ground, and washed, will, by using four pounds for one, produce all the effect of the best prepared. This fact is highly important to manufacturers, as it points out to them an easy and cheap way of obtaining the article for their own consumption, at less than half the price paid by them for the foreign article.

These facts will prove incontestably that our soil and climate are admirably adapted for the cultivation of madder. The only impediment to our success lies in the fact that it requires from two to three years to realize a crop, and our farmers are ever impatient for quick returns. I shall commence by describing the mode of culture, and then give the process of drying and grinding for distant markets.

Preparation for the crop.—It will be necessary to plough the land deeply for madder, before the winter, into high ridges, in order that it may be exposed to the action and influence of the frosts and the atmosphere. Early in the spring these ridges should be well harrowed down by a heavy long-tined harrow, and then ploughed again in the contrary direction to a good depth; and after this, when the land is not perfectly clean from weeds, or not rendered sufficiently fine and mellow, another ploughing and another harrowing should be given. In the last operation the ground should always be left in as level and even a state as possible. It is then ready for the reception of the plants.

Sowing and planting.—The sets or plants may then be obtained either by sowing the seeds upon a bed of earth which is rich, and made perfectly fine by digging and raking in the spring, and then lightly covering it, or from offsets or suckers from the old plants. In the first method, on the plants appearing, they should be made perfectly clean by weeding, and be set out at the distance of three inches in the beds by the hoe; in this way, by keeping the ground quite clean, and well stirred about the plants, they will be ready to set out in the second autumn, though it will be mostly better to defer the business till spring. It requires about thirty thousand

plants for setting an acre of land. The most suitable time for taking the sets is shown by the plants having attained the height of 10 or 12 inches from the ground, and the suckers having thrown out fibrous roots from their bottoms. This may be seen by drawing up a few of the plants, and usually about the latter end of May or beginning of June. Besides, it is necessary that the sets shall have formed root fibres at the bottoms before they are removed; as where that is not the case they never succeed well.

The land being prepared as directed, and the plants provided, a sufficient number of laborers are to be employed, that the work may be performed as expeditiously as possible. In taking off the sets, much care is necessary not to injure them. The number of plants that can be set in a short time should be taken up at once. They should be prepared by having a third part of their tops cut off. A sort of thin batter should be made by mixing good vegetable mould and water well together; and as madder roots contain a large portion of free potash, I would recommend an addition of half a pound of potash to the batter used for the shoots, for every five pounds of fine mould, and this first dissolved in the water before mixing with the mould. Into this batter the roots and the sets should be well dipped before they are placed in the earth, as by this means the necessity of watering the plants afterwards is prevented. This work is executed by a person before the planting commences. Two others are employed afterwards in distributing the plants, so as to be convenient for putting them into the ground.

These sets, after the land has been formed into beds five feet in breadth, with two feet between each for intervals, are put in by means of a line and a dibble, beginning at a distance of six inches from the outside, and setting a row of plants at a distance of five, six, or more, inches from each other; then removing the line two feet further on them, and putting in another row; and so on, till the bed is finished. In this way, each bed contains three rows of plants, at two feet distance each.

After cultivation.—As some of the plants are liable to die soon after the work has been performed, it is necessary, in the course of two or three weeks, to look over the ground, and put fresh vigorous plants in the places where the others have been destroyed.

It is of the greatest consequence to the growth that it be kept perfectly clean from weeds, and that the mould be occasionally stirred about the shoots of the plants.

WM. PARTRIDGE.

For the American Agriculturist.

CULTIVATION AND MANUFACTURE OF MADDER.—No. II.

Before giving directions for the manufacture of madder, as practised in Europe, I will inform our farmers of the mode pursued in Kentucky of cultivating it.

They first dig the ground to a good depth, making the mould very light and mellow; they then plant small roots in rows; and when they have thrown up stalks of about a foot in length, they bend them down, and throw over them a layer of mould; these will throw up fresh stalks, which undergo the same process. This covering up is continued until the third year, when the bed is opened with a pitchfork, and all the roots large enough for use are washed and dried under a shed. The smaller roots are planted in

fresh beds. The beds must be kept clean from weeds. The stalks, when laid down, become roots. The roots most valuable for coloring are from the size of a small goosequill to that of the little finger. If much larger, the coloring matter will be of little value; and if many such are ground with the smaller roots, the whole mass will be injured.

I shall now proceed to describe the manufacture of madder roots for the market. I transcribe this account from A. Ure, on the arts, &c., published in England last year.

"The madder, taken from the ground and picked, must be dried in order to be ground and preserved. In warm climates, it is dried in the open air; but elsewhere stoves must be employed.

"The stringy filaments and epidermis are to be removed, called mull; as also the pith, so as to leave nothing but the ligneous fibres.

"The preparation of madder is carried on in the department of the Rhone in the following manner:

"The roots are dried in a stove, heated by means of a furnace, from which the air is allowed to issue only at intervals, at the moment when it is judged to be saturated with moisture. The furnace flue occupies a great portion of the floor; above are three close gratings, on which the roots are distributed in layers of about eight inches. At the end of twenty-four hours, those which are on the first grated floor, directly above the stove, are dry; when they are taken away and replaced by those of the superior floors. This operation is repeated whenever the roots over the stove are dry. The dry roots are threshed with a flail, passed through fanners similar to those employed for wheat, and then shaken upon a very coarse sieve. What passes through, is further winnowed and sifted through a finer sieve than the first. These operations are repeated five times, proceeding successively to sieves still finer and finer, and setting aside every time what remains on the sieve. What passes through the fifth sieve is rejected as sand and dust. After these operations, the whole fibrous matters remaining on the sieve are cleaned with common fanners, and women separate all the foreign matters which had not been removed before. For dividing the roots, afterward, into different qualities, a brass sieve is made use of, whose meshes are from $\frac{1}{4}$ to $\frac{1}{8}$ inch in diameter. What passes through the finest is rejected; and what passes through the coarsest is regarded of the best quality. These roots, thus separated, are carried into a stove, of a construction somewhat different from the first. They are spread out in layers of about four inches in thickness, on large lattice-work frames; and the drying is known to be complete when, on taking up a handful and squeezing it, the roots break easily. On quitting the stove, the madder is carried, still hot, into a machine, where it is minced small, and a sieve separates the portion of the bark reduced to powder. This operation is repeated three or four times, and then the bolter is had recourse to. What passes through the sieve, or the brass meshes of the bolter, is regarded as common madder; and what issues at the extremity of the bolter is called the flour. Lastly, the madder which passes through the bolter is ground in a mill with vertical stones, and then passed through sieves of different sizes. What remains above is always better than what goes through."

The manufacture of madder roots appears to be a very formidable operation; yet, when reduced to practice, I suspect most of the difficulties so apparent in description would vanish.

WM. PARTRIDGE.

For the American Agriculturist.

CULTIVATION OF MADDER, AND DYEING.—No. III.

There are some facts relative to madder, equally interesting to the cultivator and to the consumer. I think it necessary that these facts should be clearly understood by every person interested in madder—dealers as well as cultivators and colormen.

There is a great want of some paper issuing from the city of New York, as a vehicle by which new facts in the *materia tinctoria* can be made known throughout our country. I can see no objection why your paper should not be the proper vehicle for this purpose. The price can be no objection to the poorest artist in our country; and, as agriculture would be essentially benefited by bringing to the notice of the consumer all new articles raised by our farmers, both parties would soon become equally interested. The facts I shall make known in this article will be worth to any dyer twenty times the annual cost of your paper; and, should our dyers generally take it, I can promise to give them, from time to time, other facts equally important.

The object of this essay is to point out to our agriculturists the effect peculiar soils have on the quality of madder, and to our dyers the effect different waters have in developing the coloring matter, affecting its brilliancy and permanency.

The following is transcribed from A. Ure's late work on arts, manufactures, &c.:

"Madder contains so beautiful and so fast a color, that it has become of almost universal employment in dyeing; but that color is accompanied with so many other substances which mask and degrade it, that it can be brought out and fixed only after a series of operations more or less difficult and precarious. This dye is, besides, so little soluble, that much of it is thrown away in the dye-house—the portion supposed to be exhausted being often as rich as other fresh madder; hence it would be a most valuable improvement in this elegant art to insulate this tinctorial body, and make it a new product of manufacture.

"Before the time of Haussmann, an apothecary at Colmar, the madder bath was subject to many risks, which that skilful chemist taught dyers how to guard against, by introducing a certain quantity of chalk into the bath. A change of residence led Haussmann to this fortunate result. After having made very fine reds at Rouen, he encountered the greatest obstacles in dying the same reds at Logelbach, near Colmar, where he went to live. Numerous trials, undertaken with a view of obtaining the same success in his new establishment, proved that the cause of his favorable results at Rouen existed in the water, which contained carbonate of lime in solution; while the water of Logelbach was nearly pure. He then tried a factitious calcareous water, by adding chalk to his dye bath. Having obtained the most satisfactory results, he was not long producing here as beautiful and as solid reds as he had done at Rouen. This practice became soon general among the calico printers of Alsace, though in many dye works the chalk is now replaced by lime, potash, or soda. But when the madder of Avignon is used, all these antacid correctives become unnecessary, because it contains a sufficient quantity of carbonate of lime—an important fact first analytically demonstrated by that accurate chemist, M. Henri Schlumberger, of Mulhausen. Avignon madder indicates the presence of carbon-

ate of lime in it by effervescing with dilute acids, which Alsace madder does not.

"M. Kuhlman found a free acid resembling the malice in his analysis of madders; but his experiments were confined to those of Alsace. The madders of Avignon are, on the contrary, alkaline, as may be inferred from the violet tint of the froth of their infusions; whereas that of the Alsace madders is yellowish, and it strongly reddens litmus paper. This important difference between the plants of these districts depends entirely upon the soil; for madders grown in a calcareous, shelly soil, in Alsace, have been found to be possessed of the properties of the Avignon madder.

"The useful action of the carbonate and the phosphate of lime in the madder of Avignon explains why madders treated with acids, which remove their calcareous salts without taking away their coloring matter, lose the property of forming fast dyes. Many manufacturers are in the habit of mixing together, and with advantage, different sorts of madder. That of Avignon contains so much calcareous matter, that, when mixed with the madder of Alsace, it can compensate for its deficiency. Some of the latter is so deficient as to afford colors nearly as fugitive as those of Brazil wood and quercitron. The Alsace madders, by the addition of chalk to their baths, become as fit for dying Turkey reds as those of Avignon. When the water is very pure, one part of chalk ought to be used to five of Alsace madder; but when the waters are calcareous, the chalk should be omitted. Lime, the neutral phosphate of lime, the carbonate of magnesia, oxide and carbonate of zinc, and several other substances, have the property of causing madder to form a fast dye, in like manner as the carbonate of lime.

"In a memoir published by the Society of Mulhausen, in September, 1835, some interesting experiments upon the growth of madders in factitious soils are related by M. M. Kœchlin, Persoz, and Schlumberger. A patch of ground was prepared, containing from 50 to 80 per cent. of chalky matter, and nearly one-fifth of its bulk of good horse dung. Slips of Alsace and Avignon madders were planted in March, 1834, and a part of the roots were reaped in November following. These roots, though of only six months' growth, produced tolerably fast dyes; nor was any difference observable between the Alsace and the Avignon species; while similar slips or cuttings, planted in a natural non-calcareous soil, alongside of the others, yielded roots which gave fugitive dyes. Others were planted in the soil of Palud, transported from Avignon, which contained more than 90 per cent. of carbonate of lime, and they produced roots that gave still faster dyes than the preceding. Three years are requisite to give the full calcareous impregnation to the indigenous madders of Avignon."

It appears to me, from the above-stated facts, that the highly beneficial effect of calcareous soils on madder is owing to the oxygen furnished to the plant by the carbonic gas so abundant in such soils; or why should oxide of zinc answer as well as the carbonates in raising the dye in the kettle, and making the color permanent?

Our farmers will observe that limestone soils are the best for madder, and that it cannot be too highly impregnated with carbonaceous matter. In such soils, two years will be all-sufficient time to raise a crop.

WM. PARTRIDGE.

No. 19—(1.)

MUSTARD—CULTIVATED.

From the Farmers' Cyclopedia.

The species of *sinapis*, generally grown in the kitchen garden for domestic purposes, are the white mustard, (*S. alba*,) and the common or black mustard, (*S. nigra.*) The first is the one grown for salads; but the seed of both is employed in the manufacture of mustard.

The soil they succeed in best, is a fine, rich, mouldy loam, in which the supply of moisture is regular; it may much rather incline to lightness than tenacity. If grown for salading, it need not be dug deep; but if for seed, to full the depth of the blade of the spade. In early spring, and late in autumn, the situation should be sheltered; and, during the height of summer, shaded from the meridian sun. For salading, the white may be sown throughout the year: from the beginning of November to the same period in March, in a gentle hot bed appropriated for the purpose, in one already employed for some other plant, or in the corner of a stove. From the close of February to the close of April, it may be sown in the open ground, on a warm sheltered border; and from thence to the middle of September, in a shady one. Both the white and the black, for seed, may be sown at the close of March, in an open compartment.

For salading, it is sown in flat-bottomed drills, about half an inch deep, and six inches apart. The seed cannot well be sown too thick. The mould which covers the drills should be entirely divested of stones. Water must be given occasionally in dry weather, as a due supply of moisture is the chief inducement to a quick vegetation. The sowings are to be performed once or twice in a fortnight, according to the demand. Cress (*lepidium sativum*) is the almost constant accompaniment of this salad herb; and, as the mode of cultivation of each is identical, it is only necessary to remark, that, as cress is rather tardier in vegetating than mustard, it is necessary, for the obtaining them both in perfection at the same time, to sow it five or six days earlier.

It must be cut for use while young, and before the rough leaves appear, otherwise the pungency of the flavor is disagreeably increased. If the top is cut off, the plants will, in general, shoot again; though this second produce is always scanty, and not so mild or tender. For the production of seed, whether for manufacture of mustard or future sowing, the insertion must be made broadcast, thin, and regularly raked in. When the seedlings have attained four leaves, they should be hoed, and again after the lapse of a month, during dry weather—being set 8 or 9 inches apart. Throughout their growth, they must be kept free from weeds; and if dry weather occurs at the time of flowering, water may be applied with great advantage to their roots. The plants flower in June, and are fit for cutting when their pods have become devoid of verdure. They must be thoroughly dried before threshing and storing. For forcing, the seed is most conveniently sown in boxes or pans, even if a hot bed is appropriated to the purpose. Pans of rotten tan are to be preferred to pots or boxes of mould. But, whichever is employed, the seed must be sown thick, and other restrictions attended to, as for the open ground crops. The hot bed need only be moderate. Air may be admitted as abundantly as circumstances will allow.—*G. W. Johnson's Kitchen Garden.*

MUSTARD—FLOUR OF.

The seeds of both black and white mustard are employed in making the ordinary flour of mustard for dietetical use. In the dry state, mustard is inodorous; and, were it possible to taste without the aid of moisture in the mouth, it would also be tasteless; the principle of its odor and taste not existing ready formed in the mustard, but requiring water for its development. The principles which exist in the mustard are two—one an acid, which has been named myronic acid, and is a compound of carbon, sulphur, hydrogen, nitrogen, and oxygen; the other a substance resembling vegetable albumen, which has been named emulsin or myrosene. When the myrosene and the myronic acid (which is united with potassa in the form of a myronate or potassa in the mustard) act upon each other by the aid of water, the volatile oil of mustard is formed, and odor and pungency given to the mustard. It is the volatile oil which reddens and blisters when mustard poultices are used; and it is important to know that vinegar checks the acrimony of the poultice, and should not be used. Tepid water only is applied.

From the United States Dispensatory.

Medical properties and uses.—Mustard seeds, swallowed whole, operate as a laxative, and have recently enjoyed great popularity as a remedy for dyspepsia, and in other complaints attended with torpid bowels and deficient excitement. The white seeds are preferred, and are taken in the dose of a table spoonful once or twice a day, mixed with molasses, or previously softened and rendered mucilaginous by immersion in hot water. They probably act by mechanically stimulating the bowels. The bruised seeds or powder, in the quantity of a large table spoonful, operate as an emetic. Mustard, in this state, is applicable to cases of great torpor of stomach, especially that resulting from narcotic poisons. It rouses the gastric susceptibility, and facilitates the action of other emetics. In smaller quantities, it is useful as a safe stimulant of the digestive organs; and, as it is frequently determined to the kidneys, has been usefully employed in dropsy.

No. 19—(2.)

From the Farmers' Cabinet.

MUSTARD SEED.

PHILADELPHIA, *9th mo.* 28, 1844.

TO THE EDITOR:

We have recently purchased from J. H. Parmelee, of Ohio, a part of his crop of brown mustard seed, raised, as he informs us, on 27 acres of good rich land, prepared with as much care as is usually bestowed upon wheat land. The seed, he says, was planted in rows, one foot apart one way, and two feet the other. The crop was well worked during the season; and when near ripe, was cut with sickles, laid on sheets or wagon covers, hauled to the barn in the sheets, and there threshed out and fanned.

He has delivered to us, as a part of the product of 27 acres of land, 114 barrels, containing 382 bushels 45 lbs. of brown mustard seed, weighing

52½ lbs. per bushel, making 20,100 lbs.; for which we paid him 8 cents per lb., making - - - - - $1,608
And he has, he says, 100 bushels of tailings, which he estimates will clean up 75 bushels—say 50 lbs. per bushel, making 3,750 lbs., at 8 cents - - - - - - - 300

Product of 27 acres of brown mustard seed - - - 1,908
or $70 66 per acre.

The time is not far distant, if not already at hand, when the interests of the American farmers will be best promoted by devoting a portion of their time and land to the raising of many crops which are now imported from countries refusing (except when their own crops fail) the surplus of the American farms, and thus not only raise the prices of their grain crops by diminishing their quantity, but secure to themselves a large amount of money which is annually sent out of the country to purchase these crops. Mustard seed is one of them, which can be raised here to a profit; and for which, if the seed is delivered clean and in good order, the demand will be found very active and certain.

Respectfully,
C. J. FELL & BROTHER,
Mustard manufacturers, 64 *S. Front street.*

No. 19—(3.)

PHILADELPHIA, *October* 21, 1844.

ESTEEMED FRIEND: We are to-day in receipt of your favor of the 19th instant, asking for the residence of J. H. Parmelee, from whom we purchased the mustard seed, as stated in our communication published in the Farmers' Cabinet of the 15th instant. We regret we are not at present able to answer your inquiry satisfactorily. The information we have given in that paper was drawn from him during a conversation had at the time we purchased his seed. At the time that gentleman was here, we had no intention of publishing any thing on the subject of the culture of the seed, but, on mentioning the crop to several farmers of the interior of our State, who subscribed to the Cabinet, they requested us to put the information in such form as they could scan and ponder on at their leisure, and we promised them to give a communication to the Cabinet; and we shall be pleased if it should be productive of any good to any part of our citizens.

In answer to your question as to the danger of overstocking the market with mustard seed: If its culture is gone into with a "multicaulis" energy, the demand for the manufacture at the present "infant state" will not be equal to the supply; but if, on the contrary, the farmers move with their usual caution and prudence, and sow each but a few acres, we think there is no fear of overstocking the market. The seed produced upon American soil always commands a preference over the imported; and if the manufacturer can rely upon a supply of seed of American growth, even at one cent per pound or fifty cents per bushel over the cost of importing it, no orders for foreign seed will be sent out by them. The manufacture of mustard in this country is yet in its infancy, and has only been undertaken on a large

scale since the passage of the tariff, giving a protection of 30 per cent. In these two years, such improvements have been made in machinery, and such knowledge obtained, as has enabled the manufacturers to produce an article which commands a preference over any heretofore imported; and we should not be considered too sanguine when we state, as our firm belief, that the importation of manufactured mustard in 1845 will not be more than one-third as much as in any of the last five years; and that, with our superior American seed, our manufacturers can supplant the English article in markets it has never yet been sent to. If such be the case, or if a prejudice in other markets should prevent the manufactured mustard being exported, the American seed has only to be tried by English manufacturers, to command with them the same preference as we give to it here. In these views of the case, we think that the demand for seed is much more likely to exceed the production, than the production to exceed the demand. You have, however, better information at Washington, of the probable demand for seed, than we have here.

We have written to a friend for a statement of the importation of mustard and mustard seed, but are, as yet, without the information. The West have heretofore supplied their own factories; but we learn that the increased demand for American mustard has compelled them to look to the East this season for their supplies of seed, and we have now an application from Kentucky for seed; and our friends at Cincinnati, under date of the 15th instant, say "the fact is, the manufacturers here, and in Kentucky and St. Louis, consume nearly all that is brought into this market." Our supplies for the last two years have, in part, been drawn from the West, and, with the exception of the lot purchased from Mr. Parmelee, we do not think, this winter, we will be able to get a single bushel there.

We have thus given you as much of the information asked for as at present lies in our power, without reserve; and regret that we have been compelled to extend our letter to so great a length. In the hope of giving you the address of J. H. Parmelee shortly,

We are, respectfully, yours, &c.

C. J. FELL & BROTHER.

H. L. Ellsworth,
Commissioner of Patents.

No. 19—(4.)

From the Ohio Cultivator.

GREAT CROP OF MUSTARD SEED IN OHIO.

Mr. J. H. Parmelee, residing a few miles below Zanesville, in the Muskingum valley, cultivated the past year 27 acres of brown mustard, and the product (as sold to Messrs. Fell & Brother, of Philadelphia) was as follows:

114 barrels, containing 382 bushels, weighing 52½ pounds per bushel, making 20,100 pounds of seed; for which they paid him 8 cents per pound, or $1,608—being a gross product at the rate of $59 25 per acre.

The soil on which this crop was produced is good lively bottom land, containing a fair proportion of sand, having an open sub-soil, and was in corn for a number of years previous. It was well ploughed and harrowed as early as it would work well in spring, (in April,) and the seed sown with

a drill harrow, in rows—the first one foot, and the next two feet apart, thus:

....

1 foot.

....

2 feet.

....

1 foot.

....

The seeds should be dropped one to two inches apart, (rather more than a quart to an acre,) and the plants thinned to two or three inches. Much care and labor is requisite to keep the ground *entirely free from weeds*, as the seeds of weeds would greatly injure the value of the crop at harvest. Indeed, this labor constitutes the largest item in the whole expense. Mr. Parmelee uses a horse, with a small cultivator so constructed that, in passing between the wide rows, one of the teeth goes between the narrow ones. Our advice, however, would be, to make all the rows two feet apart, (to save labor in cultivating and hoeing,) and, if the ground is in good condition, the plants will be sure to fill all the space, when at maturity, and yield as much seed as if the rows were closer.

In harvesting, great care is necessary to avoid shelling. It is cut by hand, with a sickle, (we believe,) and laid in rows a short time to perfect the ripening; then hauled to the barn on a sled, with a wide frame at bottom covered with canvass. It is then threshed and cleaned like ordinary grain.

One thing should be borne in mind by those who may contemplate raising this crop—namely, that the seed (some of which is sure to shell in harvesting) is a sore and lasting plague to other crops that may follow it; so that it is best to keep the same land devoted to this purpose as long as it can be done with advantage.

For fear that Mr. Parmelee may think we shall spoil his trade by inducing too many to engage in the business, we will here state that we happened to meet one of the Messrs. Fell above mentioned at an exhibition in Delaware last fall, and he then informed us of the crop of Mr. Parmelee, and remarked that the demand for the seed is so extensive that it will require many such crops to be produced annually to supply it, or to have any material effect on the price. And as the principal part of the supply for this country is now imported, patriotism demands that this information should be diffused, and the supply produced at home.

Note.—The account of Mr. Parmelee's crop, as published in the Farmers' Cabinet and several other papers, contained some errors, both as to product and cultivation. The 100 bushels of "tailings" should read 100 *pounds*. We had our information from a near neighbor of Mr. P.

No. 20.

From the Farmers' Encyclopedia.

CULTURE OF INDIGO.

Indigo—(*indigofera*, from indigo, a blue dye-stuff—a corruption of *Indicum*, India, and *fero*, to bear. Most of the species produce the well-known

dye called indigo, the finest of all vegetable blues.) This is an extensive genus of rather elegant plants, the shrubbery kinds of which are well worthy of cultivation. The stove and green-house shrubbery kinds thrive best in a mixture of sandy loam and peat, and may be increased without difficulty by cuttings of the young wood planted in sand under a glass in heat. The annual and biennial kinds must be raised from seeds sown in a hot bed in spring; and when the plants have grown a sufficient height, they may be planted singly into pots, and treated as other tender annuals and biennials. The genus belongs to the natural order *leguminosæ;* hence the flowers resemble the pea tribe. The *vexillum* is round, emarginated; the heel furnished with a subulate spur on both sides; stamens diadelphous, style filiform, legume continuous, one or more seeded, two valved. The *indigofera cærulea* yields the finest indigo; the *I. argentia* an inferior kind, which comes from Egypt; the *I. tinctoria*, besides yielding indigo, is also medicinally employed; and the powdered leaf of *I. anil* is used in some diseases of the liver.—*Paxton.*

Indigo, when cultivated, thrives best in a free rich soil and a warm situation, frequently refreshed with moisture.

The usual course pursued for its culture is as follows:

Having first chosen a proper piece of ground, and cleared it, hoe it into little trenches not above two inches or two inches and a half in depth, not more than fourteen or fifteen inches asunder. In the bottom of these, at any season of the year, strew the seeds pretty thick, and immediately cover them. As the plants shoot, they should be frequently weeded, and kept constantly clean until they spread sufficiently to cover the ground. Those who cultivate great quantities only strew the ground pretty thick in little shallow pits, hoed up irregularly, but generally within four, five, or six inches of one another, and covered as before. Plants raised in this manner are observed to answer as well as the others, or rather better; but they require more care in the weeding. They grow to full perfection in two or three months, and are observed to answer best when cut in full blossom. The plants are cut with reaping hooks a few inches above the root, tied in loads, carried to the works, and laid by strata in the steeper. Seventeen negroes are sufficient to manage twenty acres of indigo; and one acre of rich land, well planted, will, with good seasons and proper management, yield five hundred pounds of indigo in twelve months; for the plant ratoons (stools, stoles, or tillers; *i. e.*, it sends out stolones, or new growths) and gives four or five crops a year, but must be replanted afterwards.—*Browne.*

The process by which the blue coloring matter is extracted from the plant in Mexico, the East Indies, &c., is as follows:

The leaves are gathered at maturity, and immersed in vessels filled with water until fermentation takes place. The water then becomes opaque and green, exhaling an odor like that of volatile alkali, and evolving bubbles of carbonic acid gas. When the fermentation has continued long enough, the liquid is decanted and put into other vessels, where it is agitated till blue flakes begin to appear. Water is now poured in, and flakes are precipitated in the form of a blue powdery sediment; which is obtained by decantation, and which, after being made up into small lumps, and dried in the shade, is the indigo of the shops. It is insoluble in water, though slightly soluble in alcohol; but its true solvent is sulphuric acid, with which it forms a fine blue dye, known by the name of liquid blue. It affords, by

distillation, carbonic acid gas, water, ammonia, some oily and acid matter, and much charcoal, whence its constituent principles are, most probably, carbon, hydrogen, oxygen, and nitrogen. Indigo may be procured also from several other plants besides *indigofera tinctoria*, and particularly from *isatis tinctoria*, or woad, a plant indigenous to Britain, and thought to be the plant with the juice of which the ancient Britons stained their naked bodies, to make them look terrible to their enemies.

If this plant is digested in alcohol, and the solution evaporated, white crystalline grains, somewhat resembling starch, will be left behind; which grains are indigo, becoming gradually blue by the action of the atmosphere. The blue color of indigo, therefore, is owing to its combination with oxygen.

Indigo is not cultivated to so great an extent in the United States as formerly, the imported article being obtained so readily. The following process of manufacturing indigo in small quantities, for family use, is extracted from the Southern Agriculturist:

"Cut the indigo when the under leaves begin to dry, and while the dew is on them in the morning; put them in a barrel, and fill this with rain water, and place weights on it to keep it under water; when bubbles begin to form on the top, and the water begins to look of a reddish color, it is soaked enough, and must be taken out, taking care to wring and squeeze the leaves well, so as to obtain all the strength of the plant; it must then be churned (which may be done by means of a tolerably open basket, with a handle to raise it up and down) until the liquor is quite in a foam. To ascertain whether it is done enough, take out a spoonful in a plate, and put a small quantity of very strong lye to it. If it curdles, the indigo is churned enough, and you must proceed to break the liquor in the barrel in the same way, by putting in lye (which must be as strong as possible) by small quantities, and continuing to churn until it is all sufficiently curdled; care must be taken not to put in too much lye, as that will spoil it. When it curdles freely with the lye, it must be sprinkled well over the top with oil, which immediately causes the foam to subside; after which, it must stand till the indigo settles to the bottom of the barrel. This may be discovered by the appearance of the water, which must be let off gradually, by boring holes first near the top, and afterwards lower, as it continues to settle. When the water is all let off, and nothing remains but the mud, take that, and put it in a bag (flannel is the best) and hang it up to drip, afterwards spreading it to dry on large dishes. Take care that none of the foam, which is the strength of the weed, escapes; but if it rises too high, sprinkle oil on it."

Seven or eight species of indigo are found in the United States, most of which are in the South. The wild indigo, (Dyer's *Baptisia*,) common in Pennsylvania and other middle States, yields a considerable proportion of blue coloring matter of an inferior kind.—*Flora Cestrica.*

No. 21.

Washington City, *January* 15, 1845.

Dear Sir: I take the liberty to call your attention to the cultivation of one of the most valuable of vegetables, destined, at no distant day, to expel from our markets one of the most extensive articles of imports, and now ad-

mitted free of duty. I mean *okra,* whose excellence in soup is universally known and acknowledged. *Its ripe seeds, burned and used as coffee, cannot be distinguished therefrom;* and many persons of the most fastidious taste have not been able to distinguish it from the best "Java." It is very easily grown. The seeds may be sown in May, in drills 4 feet asunder, an inch deep and 8 inches apart, and cultivated like corn or peas. It sends up a strong stalk, and yields a great abundance of seeds, and the "coffee" made from it is very healthy. I think it matter of great importance, especially to the Western States, and herewith send a bag of seeds for distribution.

Very respectfully,

J. F. CALLAN.

Hon. H. L. Ellsworth.

Extract from the Farmers' Encyclopedia.

Okra, (*hibiscus esculentis.*)—This plant is extensively cultivated in the West Indies, from whence it has been introduced into the United States. The pods are gathered green, and used in soups. They form an important ingredient in the celebrated gumbo soup of New Orleans and other Southern places. The pods are filled with seeds and a mucilage, of a bland and highly nutritious quality. Hence, the okra is frequently recommended to persons afflicted with dysentery and other bowel complaints, eaten either boiled or made into soup. When buttered and spiced, they afford a rich dish; and, with vinegar, they make a good pickle. The plant comes to maturity in the middle States, and the pods are abundant in the Philadelphia market. Those who become once accustomed to this wholesome vegetable contract a great fondness for its peculiar flavor. In Louisiana, and other Southern States, a dinner is scarcely considered complete without okra cooked in some way or other; and the poor consider it one of their greatest blessings. The pods are of a proper size when 2 or 3 inches long, but may be used as long as they remain tender. If fit for use, they will snap asunder at the ends; but if too old and woody, they must be rejected. One peck of the tender pods are to be cut crosswise into very thin slices, not exceeding one-eighth of an inch in thickness; to this quantity, add about one-third of a peck of tomatoes, previously peeled and cut into pieces. The proportion of tomatoes may be varied to suit the taste. A coarse piece of beef (a shin is generally made use of) is placed in a pot or digester, with about 2½ gallons of water, and a very small quantity of salt. This is permitted to boil a few minutes, when the scum is taken off, and the okra and tomatoes are thrown in. With these ingredients, in the proportions mentioned, the soup is very fine. Still, some think it improved by addition of green corn, Lima beans, &c. The most essential thing to be attended to is the boiling, and the excellence of the soup depends almost entirely on this being done faithfully; for, if it be not boiled enough, however well the ingredients may have been selected and proportioned, the soup will be very inferior, and give but little idea of the delightful flavor it possesses when well done. A properly constructed digester is decidedly the best vessel for boiling this or any other soup in; but, where such a utensil is not at hand, an earthen pot should be preferred; but on no account make use of an iron one, as it would turn the whole soup perfectly black, instead of the proper color, viz: green, colored with the rich yellow

of tomatoes. The time usually required for boiling okra soup is about 5 hours; during which, it should be occasionally stirred, and the ingredients mashed. When taken off, the original quantity will be reduced to about one-half, and the meat "done to rags;" the whole forming a homogeneous mass, of the consistence of thick porridge.

No. 22—(1.)

CULTIVATION OF CELERY.

New York, *December* 12, 1844.

Dear Sir: The cultivation and growth of celery, that most excellent and wholesome winter vegetable, requires the close attention of the gardener to bring it to perfection.

A practical gardener will soon learn the art; and for the benefit of those who have yet to learn it, I beg to hand you the result of my own experience for the last 25 years.

In this country, it is not necessary to sow the seed before the month of May, and then in the open ground, well manured with stable dung thoroughly cured, and not less than a year old. The color, whether white or red, is a matter of taste. I generally mix my seed, and thus have both species. The seed is slow of vegetation, but, if good, never fails to germinate. Whether the seed be sown broadcast or in drills, is a matter of no consequence; as the seed being very small, the plants are sure to shoot up thick. So soon as the sprouts have attained the height of an inch, they should be pricked out in a bed of rich mould, at the distance of about three inches each way from each other. You cannot have good strong stocky plants without pursuing this method. If left standing in the seedling bed, they will grow spindling, weak, and consumptive. No more attention is required, excepting that of keeping the plants perfectly free from weeds, until August, when you will find the plants strong, healthy, and vigorous.

Any time in this month, dig your trenches 18 inches deep and as many wide. For this purpose, I generally occupy the ground that has been used for early peas.

The quality of the celery, and chiefly its growth, depend entirely upon the next step. The trenches should be half filled with thoroughly cured stable manure. I have found the manure used for early hot beds the best. It never fails of success. The increased fermentation of the manure, by the repeated waterings of the beds, the escape of the ammonia and noxious qualities of the manure, renders it sweet, and capable of imparting the mildest and richest flavor to the plant. If fresh manure from the yard, of whatever kind, is used, the celery will invariably grow strong and rank, with as little delicacy of flavor as there is in the manure. With a garden fork of four tines, strike through the manure in the trench into the earth beneath, and bring it up fresh, carefully mixing it with the manure as you proceed from one end of the trench to the other. Attention to this point is indispensable to the growth of good celery.

The plants taken up should be trimmed about the crown, just at the top of the root; all the young suckers taken off, leaving the plant trim and neat, with all its main stalks. With a dibble, which should be as large as

the handle of a spade, as the roots will now be of considerable size, begin at one end of the trench with your face towards the other, and set in a single row of plants in the middle of the trench, and not less than 6 inches asunder; water them well. No teetotaler loves water better than celery. It cannot have too much. The roots of this plant require more room than is generally allowed them, as any one may see when they are taken up for the table.

Earthing up the plants should be delayed until they have attained a good size; and then it requires care, especially the first time. I always get into the trench myself, and, holding the plant with all its stalks firmly in my left hand, with a short-handled small hoe draw the earth up round the plant, without allowing it to come in between the stalks. When this is done, and the plants thus protected, you may, with a spade, strike off the edges of the trench, and partially fill it. As the plant grows, (as it now will, if well watered in dry weather, with great vigor,) continue to earth up, and by the 1st of November the plants will be two feet above the level of the earth, with a main stalk the size of a man's arm.

Sometimes, particularly if the season be dry, celery is liable to be attacked by a fly. In that case, you will see the tops of the celery turn brown and wither. The moment that symptom appears, no time is to be lost in calling in the doctor; for the whole crop is at stake. The cause of the disease is the sting of a fly upon the leaves of the celery. The egg is deposited between the integuments of the leaf, and soon hatches into a small white worm—sometimes visible on opening the leaf to the naked eye, always by the aid of a microscope. If not attended to, the disease gradually descends to the root, and the whole plant falls a sacrifice. Amputate every defective and diseased leaf; and early in the morning, whilst the dew is on, sift on to the whole of the plants fresh slaked lime. One such powdering is generally sufficient; but if not, give them another dose, and the first rain that falls will wash the plants clean, and you will probably see them fresh, green, and stretching away towards maturity.

With regard to the mode of securing the crop for winter use, gentlemen have their fancies. I prefer leaving the plants in their original trenches, earthing up to the top of the plants, and covering with straw litter and boards, so as to protect them sufficiently from the frost, to be able to take them up as wanted; and this always fresh and and sweet. I do not fancy disturbing the roots, and transplanting into narrow quarters.

Finally, any one in this country who wishes to have "first rate" celery must cultivate it himself. Common laborers are sure to spoil it. Professional gardeners are seldom found, and generally too expensive when they are.

Your obedient servant,

JUNIUS SMITH.

Hon. H. L. Ellsworth.

No. 22—(2.)

Extract from a letter from Henry Smith, Esq., dated Astoria, New York, January 13, 1845.

Dear Sir: Agreeably to your request, I have measured some of the celery, taking a fair run of that which was taken up from the back garden.

1st root measured 29 inches in length, and diameter proportionally large; 2d root measured 29 inches in length, diameter in proportion; 3d root measured 29 inches in length, diameter also in proportion.

The celery is as fine as I ever had in quality; and I do not know that I ever saw much better, even in Lancashire, where you know they are proverbial for fine celery. The parcel which we removed from the garden to the cellar, under the wing of the house, is all decaying, very much as we expected it would; whilst the lot left standing in the garden is beautiful and fresh.

No. 23.

Extracts from Thaer's Principles of Agriculture.

ON SOILS, &c.

"A blackish hue on the soil usually induces the supposition that it contains an abundance of humus; and, in the majority of instances, this opinion will prove correct, unless the color arises from the presence of oxide of iron or manganese. The remarkable fertility of land colored by humus does not admit of its being long mistaken.

"All doubts upon the subject may, however, soon be removed, by submitting a ball of the earth in question to incandescence in an open crucible, which will allow the atmospheric air to come in contact with it; in this case, if the dark color arises from the presence of humus, it will speedily disappear, and the earth will become quite white—an effect which is not produced when the dark hue arises from the oxide of iron. The simplest means of ascertaining and estimating the quantity of humus contained in a soil, is to burn it. A certain portion of the soil which we wish to analyze, taken not too near the surface, should be dried in the sun till it pulverizes in the hand, and feels quite dry; the small stones should then be picked out, and the remaining portion accurately weighed, placed in a crucible heated to a perfect state of incandescence, and kept in that state for about ten minutes, (or at least until the black hue has entirely disappeared,) and gently moved or stirred with a glass tube all the time. In order to accelerate the total combustion of the humus, and shorten the operation, a small portion of nitrate of ammonia may be united with the earth, which completely volatilizes that substance; the diminution of weight will indicate the quantity of humus which the soil contained. There is no doubt that the earth, especially if it be of an argillaceous nature, loses some of that water which was so closely united with it, to be evaporated only by the process of incandescence. But this will make a very trifling difference in the weight; and if the earth was previously well dried, it will not amount to a fraction. But where the soil contains a good deal of lime, the volatilization of its carbonic acid, as well as of its water of crystallization, will cause a sensible difference in the result of the experiment; it is therefore highly necessary to begin by getting rid of the lime. The acidity of humus may be detected by immersing a strip of blue turnsol paper in a liquid paste formed of the earth we wish to analyze, and water. If the paper turns red, that may be considered as a certain sign of the presence of an acid. Sour or acid humus also betrays itself by the peculiar odor which

it emits when burned—an odor similar to that given out by burnt turf. If humus, when burning, smells like burnt feathers, it is a sign that it originates in animal matter, and is consequently richer, and may be more easily decomposed.

"There is no doubt that a more definite analysis of humus might be effected by means of the pneumatic apparatus, and by dry distillation; but an agriculturist has it not always in his power to perform this operation. Arthur Young frequently performed these experiments, and found that the quantity of hydrogen gas which he obtained was always in exact proportion with the fertility of the soil. The experiments conducted by Priestly were attended with similar results, and serve to confirm this fact.

Clay increases the fertility of the land: 1st. By the adhesion which it contracts with water. This adhesion is so great, that, even during a long drought, the clay always preserves that humidity which is indispensable to the nourishment of plants; and although it may appear to be entirely parched up, it is still capable of communicating to them that moisture, without which they could not exist. 2d. By the solid support which it affords to the roots of plants, as well as by the resistance which it opposes to their too great extension; obliging them to put forth several tufts of short fibrous roots, by means of which each plant seeks its nourishment in the circumscribed spot, and, consequently, does not deprive its neighbors of their fair share. 3d. By preventing the atmospheric air from coming in contact with the roots of the plants, (to which it is almost invariably injurious,) and by communicating to them a moderate and equable degree of warmth; thus preserving an equality of temperature, notwithstanding the constant changes going on in the atmosphere. When argillaceous land is not too damp, the effects of sudden changes from hot to cold, and *vice versa*, are consequently less injurious to the crops growing on it, than they are to those which grow on sandy soils. 4th. It attracts oxygen, the substance which is so necessary to the formation of carbonic acid. It probably attracts nitrogen also; and thus favors the reciprocal action of these substances upon each other.

"On the other hand, an excess of clay is injurious: 1st. Because, in damp weather, it retains the water with which it is impregnated too long; neither suffering it to drain nor evaporate, but forming with it a tenacious paste. 2d. Because, in dry weather, it becomes too hard, opposes too great a resistance to the roots of the plants, and not unfrequently contracts, and becomes like a mass of brick. 3d. Because, both during the summer heat and winter frosts, it cracks into gaps or clefts; by which means the roots of the plants are torn, or brought into immediate contact with the atmospheric air, which is generally injurious to them. 4th. Because it forcibly attracts and incorporates with itself all the nutritive juices contained in the manure bestowed upon it, and cannot be made to part with them again so easily as in looser and lighter soils. In fact, when it has once been thoroughly ameliorated, and in a manner saturated with manure, and brought into good condition, it retains its fertility for a considerable period; but, if once impoverished or exhausted, the first manurings bestowed upon it have little or no effect upon the vegetation. Land of this nature, therefore, must be manured very plentifully, or the first crops derive little or no benefit from the amelioration. 5th. Because it renders the task of cultivating the soil extremely difficult. In damp, wet weather, it is almost impossible to pass either plough, harrow, or wagon over it; it

sticks to the two former instruments, clogs them, and impedes their action, and with difficulty can be divided; while, in dry weather, it contracts, and becomes so hard that it is with the greatest difficulty a plough can divide it even into large clods; and these, until they have been moistened with rain, can neither be broken by the harrow nor the roller, and, not unfrequently, a mallet is obliged to be used for this purpose; and even then, the end in view is but imperfectly attained. The injurious effects of an excess of clay may, in part, be counteracted by the addition of humus; but, as we have already stated, this will not entirely obviate them. Lime is also rather beneficial in this case, as we shall presently see; but nothing is so really beneficial as sand; and that is the substance which is generally used. The superior layer of the soil always contains some portion of sand; and were not this the case, it would scarcely be possible for any agricultural instrument to act upon it. Consequently, the estimation of most lands ought principally to be based upon the proportions in which clay and sand are united in them.

"Previously to pointing out what these proportions are, I must, in the first place, explain precisely what I mean by sand. My intention is to designate, under this term, that coarse-grained silica which, when any portion of earth is carefully washed, is precipitated to the bottom of the vessel, and there can be collected. Recent experiments have shown us, when clay is boiled in water, a considerable quantity of fine-grained silica is separated from it; and that, if this operation is prolonged, and carefully performed, the alumina will at last be deprived of nearly the whole of its silica. It appears that the quantity of this fine silica constitutes the principal difference which exists between rich and poor clay; that clay, properly so called, is always combined, at least in an intimate manner, with a fixed and definite quantity of silica, although it may be mechanically united with a much larger portion. I cannot as yet affirm that such is the case, but I think it very probable.

"As the end we now have in view is to regulate and determine the value and utility of land according to the proportions of its constituent parts, and to effect this purpose in the simplest possible manner, we shall not pay any attention to this fine silica, which cannot be separated except by boiling, but regard clay as pure when it has been carefully washed. In by far the greater number of cases, at least fifteen parts more of fine silica might be extracted, by boiling from a hundred parts of clay which has been purified by washing. The proportion of this substance obtained from some particular kinds of land is still greater. The experiments and researches hitherto made do not enable us to determine how far clay, which contains a still greater portion of this substance, is benefited by the addition of sand, and what quantity of that matter is necessary to give it the desired degree of porousness. When the soil is composed of almost equal parts of pure clay, and of that kind of sand which can be separated from it by washing, we designate it clay land, or potter's earth; and we preserve this denomination so long as the soil does not contain more than from 40 to 60 parts in 100 of sand; and, according as this proportion is increased or diminished in it, *loose* or *stiff* and *tenacious dry* clay land. A soil which contains less than 40 parts in 100 of sand is called argillaceous land; the smaller the proportion of sand which it contains, the more stiff and tenacious does it become, and the more evident are the defects of the clay. Land containing,

at most, only 20 parts in 100 of sand, is very stiff and crude, and cannot be tilled without great difficulty, unless its defects are corrected by a considerable admixture of humus and lime. Its quality, however, depends in a great measure upon the nature of the clay, and the quantity of silica which enters into its composition; such a soil is less defective if, while it contains only a small portion of sand, it possesses a large quantity of silica. When this argillaceous land does not contain sufficient humus to enable it to bear wheat without being manured afresh, and consequently cannot be entered in the first class, it will be termed wheat land of the second quality, or second-rate wheat land; but then it must not be totally destitute of humus. On rising grounds or eminences, we seldom find land, submitted to ordinary cultivation, which contains more than 3 parts in 100 of this compound matter; nevertheless, this land is well adapted for wheat, and that species of cereals succeeds much better, and with less trouble, than rye. Next to wheat, barley thrives best there, if the soil contains from 30 to 40 parts in 100 of sand; but when it only contains a smaller proportion, and this defect is not remedied by a strong admixture of lime, it is better adapted for oats. Such land is also exceedingly proper for the growth of vegetables, provided that it is sufficiently ameliorated. That which contains most sand is favorable to peas; while a stiffer and more tenacious soil grows beans with greater advantage.

"The value of land diminishes in exact proportion with the decrease in the quantity of the sand contained in it, unless it belongs to the class of marly or calcareous soils, or to those which are strongly impregnated with humus. Thus, a soil containing 40 parts in 100 of sand is of the greatest value, while that which contains but 5 parts in 100 is much less esteemed. A tenacious and argillaceous soil, which is plentifully manured, and situated where an alternately hot and moist temperature not only favors the operations of ploughing and fallowing, but the processes of vegetation, is sometimes very superior, especially for the growth of wheat; but if we come to consider the difficulty there is in cultivating it, and how much more uncertain and casual the crops are there than they would be on a lighter soil, there can no longer be any doubt as to its inferiority in value. I estimate land which contains 2 parts in 100 of natural humus, 40 of sand, and about 60 of pure clay, at 70; that which only contains 30 parts in 100 of sand, at 60; that which contains but 20 parts, at 50; that which contains only 10 parts, at 40. Should it not possess more than 1 in 100 of humus, its value is decreased at least 20 per cent. Thus, tenacious soil, with little or no mild soluble humus, and which is usually termed cold, damp land, is actually one of the most steril that possibly can be; and may, in point of value, be assimilated to sandy land. On the other hand, its value is increased in proportion to the quantity of humus and clay which it contains; and such land may even be good enough to be entered in the first class, when it can be abundantly manured and properly tilled.

"Land which contains more than 40, or from that to 60 parts in 100 of sand, is usually designated clay or potter's earth; but the less the proportion of sand falls below 40 parts in 100, the greater is the value of the land, supposing it to possess an equal quantity of humus. Where the proportion of sand does not exceed 50 parts in 100, the soil is equally adapted for the production of wheat and barley. But when that proportion increases from 50 to 60 parts in 100, wheat certainly may be grown there, provided the soil is properly cultivated; but the crops are never very fine or very abun-

dant, and the land is much more impoverished than it would have been if cropped with rye. Such a soil is, however, peculiarly well adapted for barley, and may be classed among the very best of those lands which are destined to bear this kind of grain.

"The inherent advantages of a soil of this nature, (viz: of causing the crops to be less casual and uncertain, being more easily worked and tilled, preserving a moderate degree of temperature and humidity, &c.,) render it so very superior to argillaceous land, that, notwithstanding, its being less adapted to wheat, it may be assimilated to wheat land in all its gradations. In this case, the gradations are in an exactly inverse direction; 40 parts in 100 of sand appearing to us to be the best proportion. In the former case, the value of the soil decreases when the proportion of sand diminishes; in the latter, on the contrary, the value decreases when the proportion is increased, but not in the same ratio.

"From the observations which we have hitherto been able to make, the value of the soil appears to be almost equal in the following opposite proportions:

Sand.	Pure clay.
50 parts in 100.	50 parts in 100.
60 do 100.	40 do 100.
35 do 100.	65 do 100.
30 do 100.	70 do 100.

"That is to say, the former are defective on account of their want of consistence, and the latter on account of their too great tenacity.

"This kind of land may be vigorously tilled without becoming pulverized; neither does it harden into clods and furrows. It is seldom injured by an excess of moisture, and yet preserves sufficient humidity to enable it to resist the effects of drought for a considerable period; and young plants suffer much less in it than in tenacious soils, because their roots are better able to extend in all directions and penetrate it; and this is the reason that barley succeeds and flourishes so much better here. Such land will doubtless only bear fine crops of wheat when it has been thoroughly ameliorated; but when in a less fertile condition, it produces finer crops of rye than are grown on more argillaceous lands. It is also peculiarly adapted for vegetables, as potatoes and radishes; for clover and other kinds of fodder; and for plants of commerce, as cabbage, linseed, tobacco, &c., the cultivation of which is easy. It seldom offers any opposition to the action of the plough and harrow; and on this account, though it does not yield fine or large crops of wheat even in favorable years, it ought, in the gradations pointed out, to be assimilated to *wheat land*, properly so called.

"Sand is injurious when it enters too largely into the composition of the soil: 1st. Because it is not sufficiently retentive of moisture, but it allows the water to evaporate or drain away, and carry with it the fertilizing particles and juices. 2d. Because it does not combine with the humus, and hardly enters into a physical union with it sufficiently strong to absorb those fertilizing particles which the atmosphere contains. 3d. Because sandy soils will not bear frequent cultivation, although constant tillage is necessary, in order to destroy the weeds which multiply so rapidly in land of this nature, especially when it contains a fair quantity of humus; and because these repeated workings deprive it of every particle of coherence, and, instead of ameliorating, tend rather to impoverish it, by bringing to the surface all that humus which was amassed in the interstices without being

combined with the soil, and thus exposing it to the action of the atmosphere and the wind, which rapidly decomposes and carries it away. 4th. Because sandy soils being good conductors of caloric, they transmit the influences of severe cold or intense heat immediately to plants, at each sudden change which the temperature of the atmosphere undergoes.

"A soil which contains more than from 60 to 80 parts in 100 of sand is termed *sandy clay*. The value of this land diminishes in proportion as the sand increases. If that which contains 60 parts in 100 be valued at 60, land containing 65 parts ought not to be estimated at more than 50; 70 parts decrease the value to 40; 75 parts to 30; and, lastly, that which contains 80 parts to 20. Wheat crops cannot be reckoned upon here, with any degree of certainty; and if the land contains 70 parts in 100 of sand, it is not at all adapted to the production of this kind of grain, unless it be submitted to a peculiar enriching course of tillage; but it is well calculated for barley, particularly when the situation is favorable, and the summers are not too dry. It is easily worked or tilled, but is more liable to be overrun and infested with seeds than argillaceous soils. It has no great degree of cohesive attraction for manure; but, on the contrary, rapidly decomposes that substance, and allows it pass into the plants which vegetate there. This accounts for it requiring frequent manurings, although these need not be very plentiful. When rich and abundant ameliorations are bestowed upon such land, it will become very rich in humus, and eventually be rendered exceedingly fertile; but this fertility rapidly declines, if the soil is submitted to an exhausting rotation.

"If it contains 75 parts in 100 more of sand, it is usually designated *oat land*; nevertheless, if we take the average of several years, we shall see that it is more proper for barley than for oats, provided it be sufficiently manured.

"A soil which contains more than 80 parts in 100 of sand is called *sandy land*; and if the proportion of this substance does not exceed 90, it is distinguished by the term *clayey sand*. Usually, so long as land does not contain more than 85 parts in 100 of sand, it is comprised in the class of oat lands; nevertheless, the success of this grain is by no means certain, and it often yields little or no produce. Rye and buckwheat are the only kinds of grain which it bears with any degree of success; and if it has been ameliorated, it is always better to sow successive crops of rye, than to sow oats after rye; because the dryness to which this soil is exposed during the summer is less prejudicial to rye than to oats. Of all the plants or vegetables which are grown for the purposes of feeding cattle, potatoes have been cultivated with the greatest success on this sort of land.

"But the frequent ploughings which, when this land is in good condition, must be bestowed upon it, in order to cleanse it from weeds, are apt to render it so loose and friable that not any of the cereals can be made to succeed on it. This is the reason that it is advisable to allow it a certain repose, or to lay it down to perennial pasture; and this latter is the means by which the greatest amount of advantage can be derived from it; for when sown with sheep's fescue-grass, (*festuca ovœna*,) rye grass, (*lolium perenne*,) Dutch clover, (*trifolium repens*,) common burnet, (*poterium sanguisorba*,) &c., it produces a pasturage which is exceedingly well calculated for sheep, although not usually sufficiently wet for cattle.

"After this period of pasturage or repose, the land may be cultivated afresh; and will, if sown with rye, yield very fine crops.

"The value of it decreases in the ratio of 1 for every 100 in which the proportion of sand increases; and this diminution takes place even when the land contains from 1 to 1½ part in 100 of humus; and if, as sometimes happens, it contains a yet smaller proportion, its value is still less.

"But if the land contains 90 parts in 100 of sand, it then belongs to a still lower class. Unless it is properly manured, nor until after a long period of repose, can it be made to bear a crop of cereals with any degree of advantage; and then this crop impoverishes it very much. Land which does not contain more than 94 parts in 100 of sand may, if properly managed, and sown with the small varieties of the *festucas* and vernal grass, be made to yield herbage enough to feed one sheep per acre during the period of repose. But when the soil contains a yet larger portion of sand, it will only bear gray-hair grass, (*aria canescens*,) yellow goats-beard, (*tragopogon pratensis*,) and some other plants which contain scarcely any nutritive juices. It then falls into the class of loose, blowing sands, the surface of which it is very dangerous to break, because then the wind moves it, and carries it away in whirlwinds. It may be regarded as an invariable rule, that sandy soil loses at least 1 part in 100 of its value by the augmentation of a hundredth part in the proportion of sand; and when it degenerates into loose, blowing sand, it possesses a mere negative value in by far the greater number of cases."

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While lime has produced such astonishing improvements in the crops, it must not be forgotten that it is at the expense of the earthy exhaustion of the humus, so necessary for vegetation; and hence the absolute necessity of manuring the land, in order to restore what is taken away. Without this precaution, barrenness will ensue. Some soils already contain too much lime. On this point, Mr. Thaer's remarks are worthy of attention.

"That proportion of lime in land, which is most advantageous to it, is a quantity equal to pure clay. Of all the fifty-three varieties of soils produced by artificial combinations experimented on by Tillet, that which appeared to be most favorable to the vegetation of grain was composed of three-eighths of potter's clay, four-eighths of shell or fossil marl, and one-eighth of sand.

"The more lime a soil contains, the less sand is required to correct the defects of the clay. But it is highly necessary that some portion of sand should enter into the combination; for, without that substance, marl, when dry, would be too tenacious, and, when moistened, too soft. General experience confirms the fact, that the proportions indicated by Tillet certainly are the best.

"But even when lime is mingled with the superior layer of the soil, in so small a quantity that it scarcely appears to have an influence on its consistence, it increases its fertility probably by means of the chemical action which it enters into with the humus and manure. From general experiments and observations, (which, nevertheless, cannot be very correct,) it appears that 10 parts in 100 of lime raise the value of argillaceous or clayey soils from 5 to 10 per cent., and even higher, when the land contains a large portion of humus.

"On the other hand, lime is injurious when the proportion of it contained in the soil exceeds that of the clay. When the lime is mingled with much sand, it forms a soil too dry and warm, and which, even when plentifully manured, cannot be made to yield good crops of any thing but those

vegetables which cannot be materially injured by drought—as maize, &c. Chalky soils, which are principally composed of lime, are of this nature, and suffer both from drought and humidity; becoming, in the latter case, sloughy.

"When speaking of the soils in which humus forms the chief component part, and in which this substance cannot be easily exhausted, we allude to those which contain more than 5 parts of it in 100. Such is only the case, however, in alluvial soils, or those which are formed by the deposite of rivers or of the sea. High grounds and mountainous districts—both those which contain a large portion of clay, and those in which sand is the preponderating ingredient—rarely possess 5 parts in 100 of humus; indeed, they seldom contain more than 3 parts of mild humus, especially at the close of a rotation, when they almost always require fresh manuring, in order to enable them to yield profitable crops. The quantity of humus contained in a soil diminishes in exact proportion with the number and condition of the crops derived from it; allowance, however, being made for the manure which it receives. This diminution is not, however, so considerable as it appears, or might be expected to be."

* * * * * "The tenacity and degree of cohesion existing between the parts of a soil can be best ascertained by examining it eight-and-forty hours after a gentle rain. Those who are accustomed to observation can ascertain all they wish to know upon this point by merely driving a stick into the soil, and sometimes even by simply pressing a foot upon it.

"In forming an estimate of the value of a soil, an examination of its depth should follow immediately after an examination of its constituent parts. By the depth of a soil, I mean the thickness of a layer of earth which forms its surface—the layer which is usually termed vegetable earth, and which is homogeneous, and equally impregnated with humus throughout its whole extent. In most land, it descends very little below the depth of that layer which has been recently removed by the plough. When a section is cut vertically, the line of demarcation between the vegetable earth and the subsoil is very apparent. Sometimes this layer is not more than three inches deep; but the usual depth is about six inches, and it sometimes extends ten or twelve inches below the surface. It is only in those places where the soil has been amassed and deposited by the action of water, or when an extraordinary system of cultivation has been carried on, that we find the soil equally impregnated with humus to the depth of one, two, or three feet: six inches may, we think, be regarded as the average of the soil. We shall therefore consider that, in order to be exempt from defects, and to be equal to the value which an investigation of its constituent parts leads us to give it, a soil must possess this depth or thickness.

"A deep soil contains a larger portion of vegetable earth, and of that succulency so necessary to the nutrition of vegetables; and even if this excess of vegetable mould should not be useful to all plants, it agrees with some of them, even when the whole depth of the soil is not turned up. And, besides, this thickness of the superior layer of his land enables a skilful husbandman to draw at will upon the riches which it contains, and occasionally, or about once in six or seven years, to turn it all up, and profit by the stores of succulency and nutrition which the under part of it will yield. The roots of all plants sown in a soil of this nature—even those of the tribe of cereals—penetrate in a right line, and seek that nutriment at a greater depth, which they would otherwise have had to extend themselves laterally in

order to obtain; and they may therefore be sown much thicker, without causing any detriment to the crop. A deep soil will therefore yield much larger crops than a shallow one, provided its nature is similar, and that it is equal in all other respects.

"The roots of corn are not as some persons assert—never more than six inches in length; I have seen them exceed twelve inches, where the soil was deep enough to admit of such an extension. The roots of vegetables and clover penetrate much deeper in a right line. The same may also be observed with respect to lucerne and root crops. Land, therefore, in which the layer of vegetable mould is very thick, is peculiarly favorable to the cultivation of these crops. Besides, such land evidently possesses one very great advantage—namely, that of suffering less from humidity than drought. The water which falls upon it has more room to penetrate before it encounters the understratum."

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"Soils which have no bottom, or in which the layer of vegetable mould is so thick that it is scarcely possible to reach the bottom of it, either by ploughing or by digging it up with the spade, present the possibility of preserving the fertility of a soil without the addition of manure; the fertility may be equally kept up either by thoroughly digging and raising the soil, or by excavating successively from place to place, and spreading those portions of earth over the surface which have been derived from the interior parts. Such soils are, therefore, of an almost incredible value.

"But in what proportion does the greater or less depth of a soil increase its value? We have already supposed six inches to be an average depth which a soil ought to possess in order to be exempt from defects on that point; and we are quite convinced that every inch added to the depth of land increases its value 8 per cent.; so that a soil where the vegetable layer is twelve inches thick is worth half as much more as that in which it is only six inches. We are not, however, prepared to say that the value increases in equal proportion when the depth is yet further increased, and becomes so great as to render it scarcely possible to reach it by means of simple ploughings; but, as the vegetable earth, which is beneath the layer turned up with the plough, cannot fail to be beneficial to plants, we shall not hesitate to affirm that every additional inch of depth beyond twelve adds 5 per cent. to the value of the soil.

"On the other hand, we should advise that, in general, the same proportions should be observed in decreasing the value, according as the upper stratum of earth diminishes below six inches, which we consider to be the average.

If, therefore, a soil of	6	inches thick	is worth	- - - -	50
That which is	7	"	" "	- - - -	54
" "	8	"	" "	- - - -	58
" "	9	"	" "	- - - -	62
" "	10	"	" "	- - - -	66
" "	11	"	" "	- - - -	70
" "	12	"	" "	- - - -	74
" "	5	"	" "	- - - -	46
" "	4	"	" "	- - - -	42
" "	3	"	" "	- - - -	38

"There is no doubt that a soil might acquire this increase of value by

means of the artificial deepening or thickening of the layer of vegetable earth. With regard to the expenses with which such an operation would be attended, they vary greatly; at one time exceeding, and at another falling below, the value of the increase of depth."

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"Land in which the vegetable soil is shallow above the sand, which constitutes the under stratum, can bear little or no sun, and is very much exposed to the effects of drought; although it appears to be, and is, very fertile during a damp temperature or in spring, while it yet retains the moisture which it has imbibed during the winter months."

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"Both the chemical action of lime, and the effect which it produces as a manure, appear to be of two kinds. On one hand, it acts on the humus by accelerating its decomposition, and rendering it soluble, and thus fit to enter the minute fibres of the roots of plants. This is the reason that an amelioration composed of lime is the more efficacious the richer the soil is in humus, and that its action is the more sensible in proportion as this humus is of an insoluble nature. Lime deprives sour humus of its acidity, and renders it fertilizing. But, on the other hand, there is every probability that, by means of its carbonic acid, lime also produces some other effect, and furnishes the plants with some actual nutritive matter. The roots of certain vegetables in particular appear to have the faculty of depriving lime of its carbonic acid, which it immediately re-absorbs in equal proportion from the atmosphere with which it comes in contact. It cannot be denied that an amelioration of lime invariably produces some effect, even on land which contains a very small quantity of humus, and that a repetition of this amendment is never without its effects; although they are, of course, very far inferior to what they might have been if the soil had contained more humus, or had been manured with vegetable or animal matter capable of producing that substance. Besides, every one must be aware that lime communicates a peculiar degree of vigor to some plants, and that the roots of these can even penetrate rough limestone, and in a manner decompose it. This remark is particularly applicable to sainfoin, the tap root of which penetrates from ten to twenty feet deep into calcareous stones, and there puts forth clusters of lateral roots which render the stone loose and friable all around them. The deeper the roots of this plant penetrate, the more vigorously does it shoot, even on calcareous rocks, or stony places which are only covered by a very thin layer of poor soil.

"Lime which has been calcined, and deprived of its carbonic acid, is much better adapted for the amelioration of land, and far more efficacious, than carbonate of lime. In its former state, it contributes infinitely more to the decomposition of the substances with which it is united, and acts far more efficaciously on organic matter than it does on the latter. But we must admit that its increased efficacy arises from another cause. It very soon re-absorbs equally as much carbonic acid from the atmosphere as it lost during the process of calcination—especially when, after having been thus reduced to powder, it is mixed with the superior layer of the soil. But the carbonic acid, which it has thus recently regained, is not, in general, so intimately combined with the lime as not to be easily absorbed by any plant, the roots of which come in contact with it. The lime continues to attract fresh portions of this substance; and thus a permanent communication of carbonic acid is established between the lime, the roots of the plant, and the atmosphere. This may serve to explain the reason that even calcareous soils

may be remarkably fertilized by the addition of lime; and that a sensible effect is produced by an addition of this substance, even when the soil already evidently contains a great quantity of it which has been accumulated there by former amendments.

"On no soils are the effects of lime so beneficial as on those which contain a great quantity of sour humus prejudicial to vegetation, or on those which have been supplied more or less abundantly with animal manure for a considerable period, without receiving an application of lime, or of some other substance of a similar nature. In the latter case, it is frequently much more efficacious than an amelioration of stable manure would be; but it soon impoverishes the soil so much, that in a few years it becomes indispensably necessary to manure it abundantly with rich animal or vegetable matters. As some portion of humus (although, in all probability, of an insoluble nature) always remains in arable land, even when it appears to be most exhausted, it of course follows that an application of lime will always be productive of very marked effects, even on the poorest soils; because it will call into action all the nutritive particles which they contain. A second amendment of a similar nature, bestowed shortly after the first, will be productive of some, although, in general, of much less benefit; and the effect of each subsequent amelioration of this nature will be progressively diminished, unless the soil receives an additional supply of humus.

"The effects of lime are far more marked on some crops than they are on others. Various observations have given rise to the opinion that it is more efficacious when applied to spring corn than to autumnal crops; and that it is peculiarly favorable to vegetables, and also to clover and grasses. Argillaceous soils are better able to bear repeated ameliorations of lime, than those of a sandy nature; because, in the first place, the physical action of this substance tends to loosen the texture of the land, and, in the second place, its chemical action lessens the disposition which all clays have to retain humus. When marshes or bogs have been drained and are brought into cultivation, they are capable of bearing repeated and abundant ameliorations of lime, because they always contain a variety of substances susceptible of decomposition, and on which the lime can exercise its solvent influence. The effect produced by lime on land of this nature is much more beneficial and durable than that of any other manure.

"On the other hand, repeated ameliorations of lime will soon totally exhaust and impoverish poor and sandy soils, and reduce them to absolute sterility, even though each separate application seems to be productive of some good effect. If the lime is unable to find any organic matter on which to act, or does not meet with clay, (an earth with which it has, in all probability, a disposition to combine, and with which it forms marl,) it then unites with the sand, and hardens into a kind of mortar, which cannot be dissolved without difficulty. When such soils have been too frequently and abundantly manured with lime, the action of the plough brings an immense number of pieces of hard mortar to the surface, which are with difficulty divided. Wherever this is the case, the land must receive repeated manurings before it will again be capable of bearing good crops. The truth of this statement has lately been demonstrated on several estates in Silesia, and occurrences of a similar nature have been remarked in those counties of England in which the triennial rotation with a fallow is practised, and where few cattle are kept, and which possess an abundance of lime."

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"Many persons who have not rightly comprehended the cause of the effects produced by lime prefer it to manure, and have believed in the possibility of doing entirely without the latter; but the total exhaustion of the soil, which such a course of proceeding must sooner or later produce, caused them to fly to the opposite extreme, and to regard the use of lime as an application in the highest possible degree prejudicial and dangerous. An enlightened and scientific agriculturist will soon perceive that the use of lime can never supersede that of dung, but that it renders this kind of manure more energetic in its action. Thus he will profit by the increased fertility which lime bestows on the first crop which succeeds the application of it, and will procure as much as possible of those substances which are adapted for the production of dung, in order to restore to the land, in the shape of stable manure, that substance of which it has been deprived by the lime forcing and increasing the vegetation of the crops to which it was applied. He will likewise know when lime will be beneficial, and when injurious; and, if he acts with moderation, will be able to employ lime with much advantage, in cases where many persons would be afraid to use it."

No. 24.

SOWING OF GRAIN.

The injury and waste of grain, from the present practice of too thickly sowing.

As in the following paper I shall propose to cultivators of my country a very considerable reduction in the quantities of seed which they have been accustomed to use, and shall endeavor to show to them that the question requires their serious attention, not only for the economy of seed, but principally as very materially affecting the after growth of their corn, it may be well to premise that this recommendation does not emanate from a theoretical agriculturist, farming only in his closet and over his books, or from one who follows agriculture as an amusing occupation; but, on the contrary, that, besides being largely engaged as a land agent, and in the cultivation of farms for the proprietors, I am a practical and successful farmer, on my own account, of between 700 and 800 acres of highly rented poor land; and, moreover, that whatever I am about to recommend, I have not only long and successfully practised, and on a large scale, but that I have ever been willing and ready to support it, by showing the crops in this way produced; and I am sure that any farmer who witnesses these, will readily allow that, with the adoption of the system of thin sowing, I grow very large crops—much beyond the general average—and on soils of a very inferior description, and with less than the ordinary expenditure in labor and manure.

There are few persons who seriously take into consideration how small a return is commonly realized from the seed sown, and how large a proportion of that return is again swallowed up for seed. Let us take wheat for instance. The practice throughout England is to sow two and a half or three bushels per acre, and the yield is seldom forty bushels, and, more commonly, only twenty bushels; and one-tenth, at least, of the crop growing is consumed as seed. These facts, and the knowledge that a single grain of wheat, planted where it has room to tiller out, will readily

produce four-hundred fold, and often very much more, has induced me, in the course of the last eleven years, to make a variety of experiments; the results of which have shown me that, independent of the waste; *a positive and serious injury is done to the crop from sowing so much seed;* and, in result, is perfectly analogous to attempting to feed four animals on a pasture sufficient only for one; and, in consequence, I have gradually reduced my proportion of seed wheat from three bushels per acre, which was my practice, down to about three pecks; which reduction I have accomplished, to the evident improvement of my growth of corn. And I have at this time (July, 1843) the finest promise of a crop on all my farms, from this latter quantity; and this, too, after one ploughing of pea and bean stubbles, and upon soils very low in the scale of natural fertility, and without having had any fallow, or having had applied any manure for some years. In order to show that it is not by any artificial aid that I have grown the crops produced on my farms, and in reply to the questions which I have so often had put to me as to what is my practice, I go into the following details. My course of cropping is as follows, viz:

First year.—Rye and tares: for green meat, and feeding off with sheep in April, May, June, and July; and followed by mangel wurtzel, swedes, cabbages, and turnips, with a liberal dressing of farm-yard dung.

Second year.—Oats or barley, with clover.

Third year.—Clover twice mown for hay.

Fourth year.—Beans or peas: the beans having turnips sown between the rows, and which come into feed in September or October.

Fifth year.—Wheat.

By this rotation of cropping, I never grow two crops of a kind in succession; and I get three green crops and three corn crops in five years. The produce of corn and cattle food grown by me in this way, I do not hesitate to say, is very much larger than I could obtain by any other; and at less expense, and far less hazardous. My practice is to drill every thing, (clover seed alone excepted;) to carefully horse-hoe, hand-hoe, and weed, so that the land may be kept perfectly free from weeds, and the soil between the rows may be stirred, and receive the benefit of pulverization and aration—advantages of which gardeners are sensible, but by farmers are lost sight of, or not sufficiently attended to. My rye and tares, for green feeding, are sown in rows, at nine inches intervals; all my white corn at twelve inches; and my pulse at twenty-seven inches. When I have established this routine, the only dressing given is for the root crop; and that with manure produced on the farm by the consumption by fatting stock of the swedes, and of hay and straw and fodder by other stock in the yard. I fatten a large proportion of sheep—at least two and a half in the year for every arable acre. These consume on the land—having oil cake, and in folds—all the turnips and cabbage, and half the rye, tares, and swedes; the feeding being so arranged that the folds extend alike over the parts cleared, with that fed. My proportions of seed per acre, and times of sowing, are as follows, viz:

Of rye, 1½ bushel, in August and September.

Tares, 1½ bushel, in three sowings—in August, September, and October.

Mangel wurtzel, 6 pounds, in April.

Swedes, 1 quart, in May.

Turnips, 1 quart, in July.

Cabbages, 1 every 3 feet, in June.

Oats, 8 pecks, in February and March.
Barley, 7 pecks, in February, March, and April.
Wheat, 3 pecks, in September and October.
Peas, 8 pecks, in January and February.
Beans, 8 pecks, in September and October.

Between the crops which are sown at twenty-seven inches intervals, I constantly, in the spring, use the horse hoes, (beginning with tines which bring to the surface all root weeds,) and pulverize the soil, and alternately with knives, which cut all on the surface. By the free use of these hoes, and by hand-hoeing the narrow-sown corn, and by drawing all weeds from out of the rows, and by using Finlayson's harrows after most ploughing, I have brought my land clean, and without fallowing; and I am sure I grow better swedes and turnips after rye and tares than I used to do after fallow, and am much less attacked by the fly.

My ploughings are all as deep as I can afford to give time and strength to them. I occasionally use the subsoil and trench ploughs—going fifteen and sixteen inches deep, and bringing all the fresh soil to the surface that I can get up.

My farms are naturally very poor. Two are principally gravel; in parts very boggy and springy; wet in winter, and burnt up in summer—reclaimed from heath only thirty years; and the other a hill farm, with but few inches of soil above the chalk. These farms have been greatly improved by the free use of the subsoil and trenching ploughs, but are only kept in profitable tillage by the general economy in husbandry, and the large returns I have obtained.

In this way, and on these farms, I have frequently produced about five quarters of the best white wheat to the acre; and have grown above thirteen quarters of oats, and above eight of barley; and my clover and turnip crops are always remarkably good.

Having, from this brief detail of my practice, shown the success, on an extensive scale, with thin sowing, I will explain why it is that three pecks of seed wheat, per acre, must be much nearer the correct quantity than ten or twelve pecks; and that any surplus of seed beyond a bushel must be very injurious to the latter growth of the crop.

The produce of an ear of thick-sown wheat yields about forty grains, (I say thick sown, for thin sown yields very much more,) and therefore the produce of an acre (or twenty bushels, the ordinary average) must be, no matter how much has been sown, the growth of the ears from one-fortieth or two pecks of seed—and that, too, is allowing only one ear to grow from each grain, and forty grains from an ear. This being the fact, of what use, I ask—or what become of the remaining eight or ten pecks of seed which are commonly sown? But, in allowing one ear only to grow from a grain of seed, and each to contain only forty grains, I am far from taking what in reality should be the produce; for a single grain, having room, will throw up ten or twelve ears, and these ears will each contain from sixty to eighty grains; and hence any provision for the loss of seed from vermin or birds is unnecessary; for, supposing half, or much more, of my small allowance to be taken away or destroyed, the deficiency of plants is immediately met by the larger size of the ear, and by the tillering which is made, and the additional ears so produced wherever room admits of the increase. Among the many proofs I have had of the advan-

tage from thin sowing, the following is a striking, and, among my people, a well-known fact. In the autumn of 1840, I had to sow with wheat a field of eight acres, and I gave out seven bushels for the seed; but, owing to an error of the drillman in setting the drill, when he had sown half of the field he found he had not put on half of the seed; but, that I might not discover by the overplus his error, he altered the drill so as to sow the rest on the remainder of the field; and in this way one-half of the field had little more than two pecks to the acre, while the rest had nearly four pecks. I did not know of the error, and was surprised and frightened in the winter by finding part of the field so thin, and, had not the rest of the field looked so much better, should have ploughed it up; but, at harvest, the thinnest sown half proved the best, and I should never have known of the error in the sowing, but for this fact having induced the caster to point it out to me.

Were the evil of the present practice confined to the waste of seed, the loss to the farmer is considerable, and is frequently equal to the rent he pays for the land. I am also about to prove it is of far too great importance to the nation not to be deserving of investigation. But the loss is not limited to the waste of seed, great as that is; for there are many other ills attendant upon thick sowing, which greatly diminish the return, and are of far more importance. At first, no matter how much seed has been sown, nearly every grain vegetates and finds space to grow; and, in the early stages, when air and soil are moist, and the plants small, there is food for all. But, as the plants increase in size, a struggle for room and nourishment commences, which increases with their growth, and finally terminates by the destruction of the weaker by the stronger plants; but not until after a contest lasting up to harvest, which leaves the survivors stunted, and the soil exhausted, by having had to support three plants instead of one; and producing mischief, which is frequently the cause of blight, mildew, and failing of the crop.

That this struggle does take place, is shown by my calculation of the number of straws that can rise into ear compared with the grains sown; and is plainly betrayed by the yellow sickly color of the thick wheat in the spring, when all other vegetation puts on its greenest tints, and by the uneven crops and the small size of the underly ears at harvest, as compared with the thinner sowing. Nature, in their growth, plainly betrays the evils of thick plantations of every description, by the dwindling plants, and by their sickly appearance; and the planter and the gardener are ever ready to take warning by the lessons she thus affords. The planters and forester well know the after ill effect of an over-crowded plantation; and the gardener, by the free use of his hoe, is careful to give ample room to each plant. It is the farmer only who, guided by his eye, is pleased in the early stages of his crops to see his ground well covered with plants of young corn, without stopping to reason upon the room wanted, and the power of the soil to bring them to maturity. That the sowing of much seed must be injurious in the after growth, appears to me self-evident; for in what way can Nature do away with the extra plants so produced, without injury to the remainder? And it is to this, I repeat, I would principally ascribe the mildew and blight and failing of the crop; for, so far, my practice proves it, that, since I have taken to sow only a bushel of wheat per acre, (and I have done so now for some years, and on many hundreds of acres of wheat,) I have rarely found any portion affected by any disease;

and so satisfied am I by the result of my practice, as shown by my crops this year, that, although I last year sowed so little, I this year intend to further reduce the quantity.

The importance of the inquiry, even in a national point of view, will be striking to every one who is made acquainted with the fact, that, were my practice of thinner sowing general, the proportion saved each year would amount to much more than the annual average of the quantity of foreign corn imported into this country during the last fourteen years.

The total quantities of wheat and flour imported, during the fourteen years ending with 1841, were as follows:

	Quarters.		Quarters.
1828 - - -	590,929	1837 - - -	559,942
1829 - - -	1,725,781	1838 - - -	1,371,957
1830 - - -	1,662,280	1839 - - -	2,875,605
1831 - - -	2,309,670	1840 - - -	3,432,765
1832 - - -	469,902	1841 - - -	2,783,602
1833 - - -	297,565		
1834 - - -	176,321	Total - -	17,566,270
1835 - - -	66,905		
1836 - - -	241,743	Averaging per annum	1,254,733

The population of England, Scotland, and Wales, which, at the end of the year 1831, amounted to 16,366,011 persons, had increased, in the year 1841, to 18,666,761 persons. For the purpose of calculating the consumption of corn during the fourteen years ending with 1841, I consider the population to have averaged, during that period, 17,000,000 persons. Taking the annual consumption of 17,000,000 persons at the ordinary allowance of a quarter of wheat to each person, it will amount to 17,000,000 quarters; and, deducting the quantity imported, 1,254,733 quarters, leaves the quantity annually consumed of our own growth to be 15,743,267 quarters. Allowing that the average produce per acre of wheat grown in the kingdom is equal to 20 bushels, and that of these 17½ bushels are appropriated for food, and 2½ bushels for seed, it follows that about 17,713,425 quarters must have been annually grown, and that, to produce this quantity, 7,085,370 acres have been sown with wheat.

Now, to sow 7,085,370 acres at 2½ bushels of seed per acre, (which is the ordinary allowance,) there would be required 2,214,178 quarters. But, to sow one bushel per acre, only 885,671 quarters would be required; so that the annual saving of seed would be 1,328,507 quarters; that is to say, 73,774 quarters more than the average of the annual importations of foreign corn the last fourteen years. And although I merely take the instance of wheat, I am, at the same time, proving what may be done with all other corn; for the saving in seed which I practise is in equal proportion with all other kinds of grain, and with equal success.

Having thus proved the magnitude of the national saving capable of being made seed in corn; and having shown that if my system of thin sowing were universally adopted, there would be no necessity, even with our present enlarged population, and without the advantage of increase in the crop, for the importation of any foreign corn; and that at once an actual saving to the farmers of arable land to the extent of half their rent may be made—I hope every practical farmer will be induced to give the

thinner sowing a fair trial. Let parts of a field be drilled with one bushel of wheat per acre, at a foot apart, taking care to hand hoe the same in the spring, and to have all weeds extirpated; and I promise that, at harvest, (supposing in all other respects the field to be alike,) these portions will yield the most and best sample.

The expense of seed wheat is generally 7*s.* or 8*s.* per bushel, and the difference between one and three bushels is therefore 14*s.* or 16*s.*—a saving per acre of consequence; and if I be right that a larger and better crop will be obtained from the lesser quantity, I shall have done a good to the farmer, that will enable him to compete with the foreign grower and lower prices, and, by placing this country independent of any foreign supply, make all corn laws of little consequence; and, for many years to come, we may grow all we want, and to spare.

HEWITT DAVIS.

3 Frederick's Place, Old Jewry,
London, July 15, 1843.

No. 25—(1.)

ON THE MANURING AND STEEPING OF SEEDS.

By James F. W. Johnston, F. R. S. S. L. and E., honorary member of the Royal Agricultural Society of England.

Public attention has lately been drawn in this country to the possibility of so manuring, or otherwise doctoring, the seeds of our usual grain crops, before they are put into the ground, as to do away with the necessity of manuring the soil itself. It has been long known to practical farmers, that, by steeping their seeds in urine, in salt and water, or in other solutions, and sprinkling them while wet with quicklime, their growth is in many cases promoted, and the rust, smut, and similar diseases, in a great degree prevented. It has been observed, also, in regard to potatoes, that in some soils a dusting of lime makes the cuttings more productive than they would otherwise be; and that, when powdered with gypsum, they thrive still better. The absolute effect, indeed, of all such applications to the seed corn, or to potatoes, will, in every case, be modified by the kind of soil in which the seed is sown. If the soil abound in common salt, the salting of the seed will be less efficacious; while if it be rich in lime, or in gypsum, the dusting of the potatoes with these substances will produce a less striking effect. Yet the above observations of practical men show that it is possible, in certain circumstances, and by the use of certain substances, so to doctor or manure the seed we intend to sow, as to make the growth of our crops more sure, and the return of our harvests more abundant.

From this *limited* conclusion, which is justified by experience, some persons have hastily leaped to the *general* assertion, *that all seeds may be so doctored as, in all circumstances, to grow more luxuriantly;* and still further, *that they may be so treated as to render unnecessary any manuring of the soil in which they are to be sown.*

It is in Germany that this latter broad assertion has been most confidently made, and most pertinaciously repeated. It has met with some credence

also among ourselves, from persons chiefly, who, like the German fathers of the statement, know a little more than the generality of practical men, but who do not know enough to enable them to see the difficulties that beset their own views, nor the limits within which their statements are true.

It will, no doubt, interest the British farmer to read the statements of those who bring forward these novel views, and to consider the degree of probability which exists as to their expectations being realized.

The great discoverer in this new line is Franz Heinrick Biches, of Castel, near Mayence, who has published a pamphlet under the title of an "*Account of the Discovery of a Method of Cultivating the Soil without Manure*," in which he thus speaks:

"The discovery of cultivating the soil without manure has been carefully verified in different countries, and in the most dissimilar soils. It is twelve years since the discovery was made, and it has, during this time, been more and more tested. The experiments have been made at various seasons of the year; and the same crop has been repeated on the same soil, without regard to the usual rotation of crops.

"The cost is very trifling—a shilling or two an acre; and the supply of the substance used instead of manure is inexhaustible."

He then expatiates on the importance of his own discovery:

"'It is not good,' says Plato, 'to push our investigations too far. The natural sciences find their limits, beyond which the mantle of Isis covers what is mysterious. Can any one reveal the nature of force, of life, and of motion?' *The mantle of Isis is now, by this discovery, at length removed.*

"It is not the discovery of a mere crude substitute for manure; but the result rests on a knowledge of the nature of plants, by which the vital power is increased in all respects, and their existence elevated and ennobled!"

Here follow some of the results of his new method:

"Who can assign limits to the growth of a plant? I possess dried plants of wheat, consisting of fifty-six and fifty-seven stalks; Indian corn, grown in a poor soil, with three or four stems, and eight or nine heads; sunflowers eleven feet high, with flower discs fourteen inches in diameter, and seeds as large as small coffee beans; potatoes above seven feet high, and tubers in proportion. Varinas and Havana tobacco have, for eight years, preserved the well-known flavor of their native country.

"Drift sands have produced crops equal in quality to the neighboring loams.

"All parts of the plants, stems, roots, leaves, seeds, and fruits, have been equally improved. The tubers of potatoes, and other roots, are tenderer, and more agreeable to the taste; turnips and fruits more abundant in sugar; flowers of brighter hues, and higher perfume.

"Agriculture can now be prosecuted after an entirely new method. Manured every year almost without cost, plants will develope themselves almost spontaneously, and yield the largest returns.

"A rotation of crops is a mere beggary from the soil! Every third, fourth, or fifth year, the farmer manures a third, a fourth, or a fifth of his whole farm; and in return, he has the pleasure of seeing his fields green, without putting much into his pocket; while now, the most profitable crops may be raised, with a luxuriance hitherto unknown."

The author here calculates the present cost of manuring the soil; and, supposing the new method to cost only one-fifth, shows how many millions the adoption of it would annually save to every nation in Europe. He

then adds: "Consider how much land in every country at present yields little or nothing, and yet might be brought into the greatest fertility; and how many people might enjoy life upon it, who are at present a burden tothe State."

"Look to England. What fearful want now exists in that country, the resources of which are every year diminishing. Men daily die of hunger, and the most talented statesmen are without hope of mitigating the evil. For several years past, the city of London has been paying 24,000,000 of florins of poor's rate, while the whole of Germany pays only 60,000,000. Berlin pays annually 420,000, and 40,000 souls are tax free. All these could find, *in the neighborhood*, land susceptible of cultivation, on which they could not only live, but from which they could pay taxes to the State."

"Potatoes are vegetable bread; Indian corn also is a wholesome nourishment; both grow beautifully on the lightest drift sand; *with the former, the whole sea shore might be covered.*"

The practical farmer will justly consider that Biches's mode of treating his seed potatoes must be something wonderful, to make them grow well on the sandy downs that line so much of our coasts. But he proceeds to give testimonials as to the efficacy of his method, and the truth of his statements. These testimonials are from practical men in various parts of Germany, and must be deserving credit *to a certain extent*. It will be proper, therefore, to hear what they say. The first two are dated Vienna, 1829, and are signed by four persons. They refer to seed sown in the imperial gardens. From the second of them I quote the following:

"In general, the plants from the prepared seeds exhibited a very much stronger growth, were of a deeper green, had thicker stems, finer and fresher leaves, larger grain, and the grain was thinner skinned, and therefore contained more meal. In particular—

"1st. The hemp was of a much larger size, and had many side shoots bearing seed.

"2d. The Indian corn had more heads.

"3d. The buckwheat was upwards of three feet high, and full of seed.

"4th. Wheat, rye, barley, and oats, are thicker, and have more numerous stems, larger ears, and more grains in each.

"5th. The lucerne was beyond all comparison stronger, had more shoots, and its roots were as thick again.

"6th. The disks of the sunflower were doubled in diameter, the cabbage had larger heads, the cucumber large fruit, while the unprepared seed yielded nothing."

I quote further, what must be considered as a mere opinion—adopted in part, no doubt, from the sanguine Mr. Biches himself:

"Since this highly beneficial discovery renders all manure unnecessary, and can be applied to the poorest soils without the necessity of having a previous stock of cattle to produce manure—which, from want of fodder, is in many places impracticable; as the material is of little cost, and as the corn crops will require less seed, its benefit to agriculture must, in many respects, be incalculable."

The next two testimonials are dated from Offenbach, in August, 1830, and are signed by five persons. Three of these had allowed their seed to be prepared by Mr. Biches, and thus speak of the effects when sown upon their own fields:

"The prepared wheat had from 10 to 15 stalks from each grain of seed, and the ears and grains were larger. The rye had nearly one-half more, and larger grains in the row. The two-rowed barley had from 8 to 15 stalks from a single seed. Generally, the produce was greater than on the best fields of their farms. The prepared flax was one-half heavier in stems and seed capsules, and the latter were double in number; and when the unprepared had already become yellow, the prepared was still of the deepest green. But the potatoes excelled every thing yet known in the most productive fields. From a single potato there were seldom less than 10, and sometimes 17 strong stems; while in the best fields there are seldom more than one-third of this number."

All other plants, clover, beans, turnips, &c., are said to have been equally benefited. One-fourth only of the usual quantity of seed of wheat and rye was sown on a poor unproductive clay, and yet the produce was greater than on the newest land of good quality, though aided by manure.

Two testimonials follow, dated September, 1831, signed by burgomasters, town counsellors, gardeners, schoolmasters, farmers, and land-valuers—17 in number. The following is an extract from the one which relates to experiments made in a garden at Büdingen:

"1st. Several sunflowers had a height of 10 to 11 feet, the foot of the stems being 8½ and 9 inches in thickness. The stems consisted of firm wood, and contained as much combustible material as young fir trees of 8 or 10 years of age.

"2d. Ten or twelve potato plants gave, on an average, 30 large potatoes each, and had stems 7 feet in height.

"3d. Fifteen stalks of Indian corn had, on an average, 5 heads each; some having as many as 8 or 9 heads to a single plant."

The next experiments quoted by the author were made at Amsterdam, in 1843:

"The buckwheat was 4½ to 5 feet high; the flax had from 4 to 5 stems from each seed; the Indian corn was from 9 to 10 feet in height, and had 4 to 5 heads from each seed; the white clover was as large in the leaves and stems as the red clover usually is; the red clover and lucerne 3 feet high.

"These results were obtained from the prepared seeds alone, without manure, on a depth of six or eight inches of the drift sands of the downs, arranged in beds for the purpose of the experiments."

Between 1834 and 1839, nothing is recorded regarding the progress of the author's discovery or researches; and he leaves us to infer that in this interval nothing had been done; since, under the date of September, 1839, he inserts only an extract from a Mayence newspaper, containing a statement of some of the results obtained in the former years. To this is subjoined one other testimonial, dated November, 1841, declaring that his potatoes sown on unmanured soil were superior to any others in the neighborhood of Castel, where M. Biches resides.

I think the conclusion which is fairly to be drawn from a careful perusal of this pamphlet is, that, for a few successive years, the author had made experiments upon the preparing of seeds, and, out of a number of less successful, had obtained some very interesting and striking results; that he had then laid the matter aside for about as many years more; and again, in 1841, made a solitary experiment or two, which he has incorporated with his previous results in his pamphlet of 1843. For twelve years, therefore, he has

been more or less occupied with the subject; but, during all that time, he has never published or given any account of his process for preparing the seeds according to his method. He is one of that class of discoverers who wish to sell their secrets, and, by magnifying their importance, hope to derive a larger profit from divulging them. With such men, the true friends of agriculture can have no sympathy.

I do not think, however, that his pretensions are wholly unfounded, or that by a skilful study of the preparation of seeds much good may not hereafter be derived by practical agriculture. The reasons for this opinion will appear in the sequel.

No. 25—(2.)

STEEPING SEEDS.

By F. W. Johnson, Esq., &c. &c.—Continued.

Another German pamphlet, on this subject, has lately appeared from the pen of a Mr. Vietor, an apothecary at Neidetholm, in Hesse Darmstadt, under the title of "*The Manuring of Seeds; or a simple and cheap cultivation of the soil by the artificial manuring of seeds; by which, at the same time, the rust and other diseases of the corn crops are prevented—practically tried for five years, and proved on a large scale.*" By C. L. Vietor.

This author describes his methods, and is, so far, more worthy of the attention of the practical man. Before detailing these methods, however, I shall insert a few of his preliminary observations.

As the principle upon which the manuring of the seeds ought to be preferred to that of the soil, he remarks, that "the manure can never be so equally distributed through the soil, that the due proportion of food shall be given to each seed or plant; and that, besides, before the plant comes to require it, much of the organic matter of the manure has become decomposed and lost; and that even the inorganic matter is liable to assume forms of combination in which it can with difficulty be made available to the nourishment of the growing plant."

These disadvantages may be avoided by manuring the seeds themselves, which we wish to grow; while, at the same time, the following advantages will attend the adoption of this method:

1. The same crop may be repeated on the same soil, though already exhausted, or even in any way usually unfruitful soil.

2. We can manure the seeds with those special substances only which it is not likely to find in the soil, or of which it has been exhausted by previous crops.

This is an advantage which is possessed by all saline and mineral manures, and is one of those benefits which will appear more clearly and strikingly to the practical man as he becomes more familiar with the natural wants of the crops he wishes to raise, and with the kind of substances which are present in his soils and in the manures—such as farm-yard manure, which he usually employs in preparing them for the seed

3. As the rotation of crops is rendered necessary chiefly by the abstraction of saline substances from the soil, it may be rendered unnecessary by adding again these substances in such a way as to be within the reach of

the seeds only. Thus, by steeping the seeds in sal ammoniac, and drying them with flour, the deficiency of salts may be supplied.

4. The rust and other diseases of corn plants are owing either to an excess or to a deficiency of food in the soil. These extremes can be best avoided by manuring the seed itself with the proper materials, and in the proper degree. "Thus," he says, "in a field of wheat, after oats, upon a poor soil, a portion of the seed, which had been prepared with sal ammoniac, gave only a light crop; while another portion, prepared with oil also, gave a crop twice as heavy."

Influenced by these considerations above stated, (some of which may, to a certain extent, be regarded as questionable,) Vietor has been induced to try the manuring of the seeds before they are sown; and, from the success which has attended his results, to recommend it to others. The substances he employs, and his mode of using them, are as follow:

Substances employed.—1. Blood, in the liquid state, is mixed with one-eightieth of its weight of glauber salts dissolved in a little water. When thus mixed, it may be kept for a long time, in a cool place, without congealing or undergoing decomposition; or clotted blood may be dried, either alone, or mixed with a little earth or powdered clay, and then reduced to powder.

2. Wool, hair, parings of leather, horns, hoofs, and bones, are charred in close vessels until they are capable of being reduced to powder.

3. The dung of all animals is dried, and reduced to powder.

4. Fats and oils of all kinds are mixed with so much earth, clay, or rye meal, as will enable the whole to be reduced to powder. Oil cakes are also powdered for use.

Mode of using them.—He makes up a semi-fluid mixture, with which he mixes the seeds; and then he dries up the whole by the addition of the powdered manures already prepared. His semi-fluid mixture is thus prepared: For a bushel of wheat, or other grain, take 20 to 30 lbs. of clay in fine powder, 1¼ lb. of pounded sal ammoniac, or 3 lbs. of common salt; 3 to 5 quarts of whale, rape, or other cheap oil; 15 to 20 quarts of fresh blood, or blood kept in a fluid state by means of glauber salts, or, in the absence of blood, as much water; 3 to 5 lbs. of linseed meal, or pounded oil cake. These are mixed together intimately, and water added, if necessary, to make a half fluid mass. The seed is then to be poured in, and stirred about till every seed is completely enveloped by the mixture. A layer of one of the following dry mixtures is then spread on the floor, over it the manured seed, and then another layer of the dry powder; the whole is then stirred together, and left to dry.

Dry mixtures.—Of these drying mixtures he describes several, consisting chiefly of powdered clay, mixed with one or other of the dry powders already mentioned. Thus, he recommends mixtures of—

1. 75 of powdered clay, 8 of horn shavings, and 17 of bone dust.
2. 85 of clay, with 15 of fluid, or five of dried blood.
3. 85 of clay, 5 of charred hair, and 10 of oil cake.
4. 60 of clay, and 40 of powdered dung.
5. 70 of clay, 25 of charred leather, and 5 of bone dust.
6. 70 of clay, 10 of fat tallow or oil, and 20 of powdered dung.

These are all to be finely powdered, and intimately mixed. The principal alleged use of the clay is, to make the other substances cohere together, and to attach them more strongly to the grain.

When the mixture of grain and manure is dry, it is broken up with the hand, and thrown upon a fine sieve, which allows the loose powder to pass through, and the uncovered grains; and then upon a coarser sieve, through which the dressed seeds pass, leaving the lumps in which two or three seeds may be present, and which are to be carefully broken up. He prescribes, further: That much caution is to be used in completing the operation so quickly that the grain may not be permitted to sprout, and thus become liable to injury during the succeeding operations.

When it is wished to grow corn after corn, in fields manured in the usual way, Vietor recommends mixing, for each bushel of seed, 2 to 3 pounds of sal ammoniac, or 4 to 6 pounds of common salt, with 10 to 15 of rye meal, adding a little water, stirring the seed well among it, and drying the whole in a stove.

Such is the substance of Vietor's pamphlet and observations. I have stated them pretty fully, because I think he deserves thus much at the hands of those who are interested in the progress of practical agriculture; because he has stated the reasons for his procedure; has described his processes fully, and claims neither great merit nor great reward for alleged great discovery. Besides, there is a show of reason in what he states; for though we may very fairly doubt (or, perhaps, entirely disbelieve) that the quantity of manure with which he envelopes his seeds can be sufficient to supply the wants of the crop that is to spring from them, yet there can scarcely be a more economical way of employing the same quantity of manure—one in which there will be less waste of it, or in which it will be more useful to the growing plant. In every way of applying manure to the soil which has hitherto been adopted, a large portion never reaches the roots of the plants. Even when drilled in along with or near the seeds, a notable quantity escapes from the roots and is more or less completely lost to the crop it is intended to feed. Such must obviously be the case, to a very much smaller extent, where it is in actual contact with the seed it is to nourish, and actually envelopes it.

Still it is doubtful whether the gain or saving effected by this method will be equal to the cost of time and labor which it involves. Should such a mode of manuring be found easily practicable, more skilful mixtures than those of Vietor—such as would be more certain to succeed, and such as would be fitted especially to aid the growth of this or that kind of crop—could easily be suggested.

In illustration of this opinion, I will here briefly state the facts from which I am led to believe that considerable benefit may, in reality, hereafter accrue to practical agriculture from a careful study of the effects of certain known steeps, or prepared mixtures, upon the after-growth of the seeds upon which they have been tried.

1st. The quantity of inorganic matter contained in the grain of wheat, oats, barley, &c., is comparatively small. In wheat and barley, it varies from 1½ to 2 per cent. of the whole weight; in oats, it is about 3½ per cent.; but a considerable proportion of this is contained in the husk with which the oat is usually invested. But, though small in quantity, this inorganic matter is absolutely essential to the perfect condition of the seed, and to he healthy growth of the plant that springs from it.

2d. When seeds are steeped in water, they swell and increase in bulk. They absorb a portion of the water, and of any saline substances it may

hold in solution. Now, if the small quantity of saline or inorganic matter which exists in seeds does really promote their growth, may not a larger quantity promote it more? May not the growth be more luxuriant if the seed be steeped in water containing saline substances in solution, and be thus made to absorb an additional proportion? It does not appear unreasonable to suppose that a bushel and a half of seed wheat may be made to absorb a pound of saline matter. This appears, indeed, to be only a very small quantity; and yet, if absorbed, it would add one-half more to that which the seed naturally contains. We cannot pronounce beforehand, with absolute certainty, that, by this absorption, the growth of the seed would be greatly promoted, though both theory and practice concur in rendering it probable. Thus the experiments of Biches, whose mode of preparing seeds appears to be a simple steeping in saline solutions, appear decisive in favor of the opinion that such artificial additions to the saline matter of the seed do really (in some cases, at least) greatly promote the growth of the seeds, and increase the luxuriance and produce of the after-crops.

The fact that saline manures are beneficial, in many cases, to the growing crop, when merely applied to the soil, is in favor of the same view. The salts, it is true, when applied to the soil, enter the plant by its roots; but, nevertheless, their action is simply to yield saline matter to the plant in larger quantities than it could otherwise readily obtain it from the soil. This additional supply might at once be given it, to a certain extent, by steeping the seed itself.

3d. Further: we know that some seeds germinate much more rapidly and certainly than others. We know, also, that the proportion of inorganic matter, or of ash, they leave when burned, varies in different samples of seeds of the same kind. That contained in wheat, for example, is sometimes $1\frac{1}{2}$, sometimes $1\frac{3}{4}$, and sometimes nearly 2 per cent. of its weight. Can this difference in the growth of seed, and the difference in the proportion of saline matter, have any connexion with each other? Do some germinate feebly, do others fail entirely, because they contain too small a proportion of the usual saline constituents of the seed? Would they germinate better if more were, by some means, given to the seed? The same experiments of Biches, upon the effect of steeping, seem almost to answer these questions in the affirmative. They at least render it very probable that some such relation does exist between the two differences to which I have alluded. The same may also be said of the observations made by Mr. Fleming, of Barochan, that seed wheat which had been dressed the previous year with certain saline substances grew more luxuriantly, and gave a better crop, than that which, though grown on the same field, had not been so topdressed. It is not very unreasonable to suppose that this better growth of the dressed seed might be owing to its having obtained, from the substances applied to the soil, a larger proportion of saline matter than that to which no topdressing had been applied.

Still, these circumstances only render probable the opinion to which I have adverted. They point out, however, new series of researches, both in the field and in the laboratory, by which the opinion will be tested, and either refuted or confirmed. In the field, experiments must be made with different seeds, dressed and undressed. In the laboratory, these seeds must be examined, and the proportion of inorganic matter they respectively contain determined; and if this inorganic matter be equal in quan-

tity in seeds exhibiting different powers of germination and growth, the difference in the kind or quality, as well as in the quantity of the ash, must be more or less rigorously ascertained. By these united methods of investigation, we may hope, by-and-by, to make out what are likely to be the real and constant effects of steeping upon seeds; to what kind of seeds or roots it may be applied most beneficially; under what circumstances this treatment ought to be especially adopted; what kind of saline substances ought to be applied to each species of seed, and in what proportions; and what is the nature of the influence they may be found to exercise in promoting, or otherwise modifying, the growth of the after-crop.

In the mean time, there are two principles by which our trial of steeps ought to be regulated, by which the saline substances we may employ with advantage in our first experiments in the field, and upon different crops, are distinctly pointed out. In a future paper I shall explain these principles, and state the practical suggestions which may be drawn from them, in regard to experiments upon the steeping of roots and seeds.

Durham, *November* 20, 1843.

No. 25—(3.)

From the Farmers' Cabinet.

SOAKING SEEDS IN CHEMICAL SOLUTIONS.

A great deal has been said and written latterly, both in this country and in Europe, particularly in Germany, respecting concentrated manures. Poudrette and guano—the one made among ourselves, the other imported from a great distance—are claiming the close attention of the agricultural community, which, we believe, is ever ready to embrace enterprises which hold out reasonable promises of advantage.

In some parts of the continent [of Europe,] the startling doctrine has been held, and tenaciously insisted upon, that *all seeds may be so treated as to grow most luxuriantly without any manuring of the soil in which they are to be sown.*

The article given below, in reference to this curious subject, we take from a late number of the "Transactions of the Highland and Agricultural Society of Scotland." Believing it to be of great interest to the farmer to be acquainted with every process by which his garners may be filled; and to the political economist, to provide for the daily sustenance of the millions whose daily wants are without a holyday, we mean to revert to this matter in a future number.—*Ed.*

"There was, perhaps, no object in the exhibition of plants in the society's show at Dundee, in August, 1843, which attracted such general attention as the remarkably strong and vigorous oats, growing in soil exhibited by Mr. James Campbell, of the educational seminaries of that town. The soil in which they grew possessed no peculiar property, except that it had not been manured for eleven years. The vigor of the plants, according to Mr. Campbell, was entirely to be ascribed to their seed having been subjected to a process by which they were soaked in certain chemical solutions. Mr. Campbell has, since the show, in the most liberal and disinterestd manner, placed the particulars of his process in the hands of the

society, for the benefit of agriculturists generally; and, to further his good intentions, the society has thought it proper to publish his own explanation of the method of conducting the process of preparing the seed, as it is given in letters addressed, at various times, to the secretary.

"The first letter contains an intimation of Mr. Campbell's intention to exhibit plants of oats at the society's show at Dundee, on the 8th of August, in a letter dated 'Seminaries, Dundee, 17th of July, 1843,' which was couched in these terms: 'Not being a member of the Highland and Agricultural Society of Scotland, some apology is necessary for my addressing you. Before proceeding further, therefore, I beg leave to inform you that some years ago I became proprietor of about 140 acres of land, some of which stood much in need of improvement. My attention has accordingly been, for a considerable time past, directed to agricultural improvement in various ways; and I conceive this may be held as an excuse for the liberty which I now take in writing you.

"'Much has of late been said and written on the subject of extraneous and other manures, and a great many nostrums have been puffed off, and applied with various success. Many composts have been formed, whose tendency is to yield abundant crops on certain soils; but it must still be confessed that no manure, or other application of much permanency of effect, or approaching to any thing like universal aptitude to soil, has yet been produced; and, in all circumstances, the expense of manures is still very great.

"'The discovery, therefore, of a process by which the cereal and other gramineous seeds might be obtained in *extraordinary* abundance, without the use of manures, is certainly a great desideratum. Now, this desideratum, however strange it may appear, I have good grounds for concluding I have attained.

"'It is now a considerable time since I began to imagine that if the ultimate principles, of which the proximate constituents of most of the gramineous seeds are composed, could, by any possibility, be made so to enter the substance of the seed, and at the same time not to injure its vitality, as thoroughly to imbue its texture with an excess of these principles, the end would be accomplished; and it is by doing this to a certain extent, that I am convinced I have succeeded.

"'In the spring of last year (1842) I began some experiments with oats, which were going on well, when, towards the end of July, I left them unprotected; and on returning, four or five weeks after, found, to my great regret, that my labor was lost by the depredations of poultry and sparrows. The stems were all trodden down, and not a grain left. I have this season, however, taken proper precautions—the whole being so secured that no bird or fowl can get access.

"'The soil in which my seeds were sown has had no manure of any kind, to my certain knowledge, for the last *eleven* years. I have corn in the *natural state* as well as others, that have undergone the process which I use, so that a comparison of the results can easily be instituted. The results of such a comparison will be found altogether surprising. I shall be prepared to exhibit specimens of various grains by different processes, on the 8th of August, in the proper place.

"'I may only further mention, that the greater number of the stems of the oats are as thick as small canes, and the leaves from 1 inch to $1\frac{1}{7}$ inch in breadth, of a vigorous dark-green color; that the seed was very light,

not exceeding 37 lbs. per bushel, and consisted of grains set aside for feeding poultry; that the average number of stems from thirty-three seeds is eleven and a half, or twelve to each seed sown; and the gross apparent produce between five and six hundred fold, both of oats and bear.

"'I am,' &c.

"On the 19th of September following, which was only a few weeks after the plants had been exhibited at the society's show, Mr. Campbell resolved to disclose his process to the public, and communicated his intention, in these terms, in another letter to the secretary:

"'When in Edinburgh, some time ago, I took the liberty of calling at your office, in the Highland Society's rooms, where I saw Mr. McDonald, and stated to him that I intended to make further communications to you respecting my plan of preparing seeds, so as to produce superior crops of grain.

"'I have, since that time, resolved that my best way was to make a full disclosure of the process to the three great national agricultural institutions of Great Britain and Ireland. With this view, I sent a communication, on the 8th inst., to his grace the Duke of Richmond, who, I then imagined, was president of both the British societies; but his grace informs me that he is not now president of the Royal Agricultural Society of England; and, not being able to attend any of the meetings at Edinburgh, recommends me to apply to you, as secretary of the Highland and Agricultural Society. I therefore now take the liberty of making to you the following communication, for the benefit of the agricultural interests of Scotland.

"'I steeped the seeds of the various specimens exhibited, in sulphate, nitrate, and muriate of ammonia; in nitrate of soda and potass; and in combinations of these; and, in all cases, the results were highly favorable. For example: seeds of wheat, steeped in sulphate of ammonia on the 5th of July, had, by the 10th of August, (the last day of the show,) tillered into *nine*, *ten*, and *eleven* stems, of nearly equal vigor; while seeds of the same sample, *unprepared*, and sown at the same time, in the same soil, had not tillered into more than *two*, *three*, and *four* stems.

"'I prepared the various mixtures from the above specified salts, exactly neutralized, and then added from eight to twelve measures of water. The time of steeping varied from fifty to ninety-four hours, at a temperature of about sixty degrees Fahrenheit. I found, however, that barley does not succeed so well if steeped beyond sixty hours.

"'Rye grass, and other gramineous seeds, do with steeping from sixteen to twenty hours; and clover from eight to ten hours, but not more; for, being bi-lobate, they are apt to swell too much and burst.

"'The very superior specimens of tall oats, averaging 160 grains on each stem, and eight available stems from each seed, were prepared from sulphate of ammonia. The specimens of barley and bear were prepared from nitrate of ammonia; the former had an average of *ten* available stems, and each stem an average of thirty-four grains in the ear; and the latter an average of also ten available stems, with seventy-two grains in the ear.

"'The other specimens of oats, which were next the most prolific, were from muriate of ammonia; and the promiscuous specimens of oats were from nitrate of soda and potass—strong, numerous in stems, (some having not less than fifty-two,) and not so tall as either the preparations from the sulphate or muriate of ammonia.

"'It was objected by some, that the tallest oats were too rank, and would break down before coming to seed; but I have no fear of that, as they were

strong in proportion to their height; and should there even be any ground for the objection, I am confident that a combination of sulphates of ammonia and soda or potass would rectify the excess of height, and render the grain equally productive.

" 'I have, at present, a series of experiments going on in the country, with seeds prepared in *seven* different ways, and sown in pure sand, and in a tilly subsoil, taken six feet from under the surface, and in which there is no humus or organic matter of any kind. Along with the prepared seeds are also some *unprepared;* and I expect to be able to form a comparative estimate of their growth, by visiting the place in October.

" 'At all events, from the experiments which I have already tried, I am quite satisfied that, even *without* the application of common manures, double crops, at least, may thus be raised; and, under the application of the ordinary manures, crops *ten-fold* greater than usual.

" 'The various salts were prepared by me from their carbonates.

" 'I am,' &c.

" The results observed on inspecting the progress of the experiments with prepared and unprepared seeds, (the intention of inspecting which, in Ocber, was intimated in the above letter,) are thus described in a subsequent letter to the secretary, dated 'Seminaries, Dundee, 16th November, 1843:'

" 'I should, before this time, have given you, as I believe I some time ago purposed to do, an account of the state in which I found the vegetation of prepared seeds, which I mentioned I had sown about the middle of last August. I visited the place on the 12th of October, and found, to my great satisfaction, that the plants from prepared seeds excelled, in a very marked degree, those from seeds sown alongside of them, but unprepared. The former had from *five* to *eight* stems, while the latter had not more than two or three from each seed; and this in an exposed situation, and among earth which was taken from a considerable depth under the surface, (about eight feet)—a kind of reddish till, rather adhesive, and not in the least pulverized by the influence of the atmosphere; and situate in Kinrossshire, about four hundred feet above the sea.

" 'The season of the year was, of course, not the most favorable, but the contrast was striking. I am,' &c.

" Mr. Campbell's sanction, obtained by application of the secretary, to give publicity to his process, is given in the following letter, dated 'Dundee, 11th December, 1843:'

" 'I am favored with your letter of the 9th instant, and am much gratified with the very flattering reception which my communications have met with from the directors of the Highland and Agricultural Society.

" 'I have no objection to the publication, in the Transactions, of the whole or any part of these communications; but shall, on the contrary, feel much pleased with it. I only regret that there is not now time for communicating some further particulars; but this may be done afterwards, with, perhaps, greater propriety.

" 'If the publication committee think proper, they may mention the price at which the liquids are to be sold. I am,' &c.

" In compliance with the reasonable request contained in the concluding paragraph of this letter, the following extract is taken from the latter part of a circular addressed by Mr. Campbell to agriculturists, in which he offers to supply them with his solutions (which he names his *corn-growing liquids*) at certain prices. The circular, after noticing the importance of

such a process as the preparation of seeds, goes on to observe, that the discoverer of this most important and invaluable process, confident, from the results of numerous experiments, of its complete success, now begs to intimate that he is prepared to supply agriculturists with his *corn-growing liquids* at the following prices, viz:

"For wheat, 2*s*. 6*d*. per gallon.

"For barley, 2*s*. per gallon.

"For grasses and oats, 1*s*. per gallon.

"These liquids will keep any length of time; and the seeds, when dry, will also keep without injury. The liquids are warranted not to injure, in any degree, the vitality of the seed; but, on the contrary, will promote its growth in an extraordinary degree.

"One-third, or even one-half, less grain is required for seed than is commonly used; and twelve gallons will impregnate eight bushels of grain; for the operation may be repeated in the residual liquid, with additional measures of grain, as not more than *one-tenth* is absorbed in each operation.

"Particular printed instructions for using the liquids will accompany invoices. No order under 20 gallons will be supplied.

"*Dudhope street, Dundee.*"

No. 25—(4.)

CHEMICAL SOLUTIONS FOR SEEDS.

From the American Agriculturist.

We have repeatedly noticed, of late, in our foreign journals, accounts of extraordinary yields of crops, from seeds which had been subjected to soaking in some chemical solutions. Although not disposed to question the accuracy of the results stated, we must still affirm our want of confidence in the excessive merit claimed by them. These preparations are useful in two ways: First, by saturating the seeds with substances distasteful to its enemies—insects, grubs, and worms; and, secondly, by affording to it an element of nutrition for the future plant, it is enabled to push forward vigorously in the first stages of its growth, and send out its roots and leaves rapidly; so as to derive an increased amount of nourishment from the soil and atmosphere, beyond other plants, which lack this early, rapid development of its organs of nutrition; by which means they are not only enabled to reach further for their food in the soil, and open an additional number of mouths, by its leaves and stems, to drink in nourishment from the air; but, as a consequence of this early, rapid development, plants are frequently enabled to attain a growth which secures them against the injurious and sometimes fatal effects of droughts and insect enemies; and, in many cases, to mature their fruits before the approach of frosts. These advantages, and other food yielded directly to the plant, are frequently of great importance to the crop; and may, in some instances, be worth ten or twenty times the cost of time and expense in the preparation, and are at all times worthy the attention of the farmer. But to claim that they yield all the elements of nutrition to the crop, is a perfect absurdity. They afford the same advantage to the plant that early attention to the young of animals does—by helping it so far forward in strength and maturity, that it is

enabled afterwards to gather up its own food, *if it is to be found within its reach*. If soil be deficient for the support of the larger plant, it must as certainly dwindle or die, as will the lamb or calf if, after it is enabled to eat grass, it is not to be had within its reach. We are justified, therefore, in concluding, that a good soil is, *in every case*, requisite for yielding a large crop, however the seeds may be prepared. We shall be obliged to our correspondents for the results in this treatment of seeds, under any variety of circumstances—of solution, kinds of seed, description of soil, and results, each minutely and accurately stated.

No. 25—(5.)

From the Farmers' Cabinet.

MANURING SEEDS BY STEEPING.

Well has the editor of the Cabinet called it a "startling doctrine, that all seeds may be so treated as to grow most luxuriantly, without any manuring of the soil in which they are cultivated;" for it seems to overthrow some of our long-accredited notions concerning manures and rich soils. From pure beach sand, or an equally barren subsoil, we are promised a greater crop, without manure, than has usually been obtained from a good soil well dressed! and this, on the simple condition that the seed used should undergo a short and cheap preparation! One cannot help being curious to know if this magic power, given to the seeds of annual and other short-lived plants, would be alike imparted to those of slower growth—to the peach, for instance, of a few years, and to the oak of a hundred? If so, what giants may the forest not be made to produce.

Yet we are bound to give heed to these claims, for they are confirmed by many witnesses; a tithe of the testimony offered to sustain them would suffice to convict of the highest crime in our courts of justice. Moreover, when we remember that a few elements constitute the food of all vegetables, and that air and water furnish the most of these; when we see a plant thrive well in a bottle of pure water, and the sturdy oak springing from a naked rock with a few chinks only for the admission of its vagrant roots, we are led to consider whether the food of plants is not more abundant and more accessible than we had supposed; and whether *the first condition of vigorous growth be not a good appetite and good digestion, to be derived only from a robust constitution through a vigorous germ or seed.* If so, we have some clew to the astonishing results referred to, and some rational ground of faith in the matter. But my object was, by relating a fact having some bearing upon the subject, to encourage others to do the same; for, doubtless, many such facts are afloat in the community, and it is only by their multiplication and aggregation that any thing like a safe theory can be formed in the premises.

Some years ago, the writer was shown, by the proprietor and cultivator of a small farm, of a light sandy soil, in the eastern part of Massachusetts, seven ears of corn, of the kind called brindled, or red and white; five were large full ears, the other two smaller, but sound and merchantable. They were all, he said, the produce of a single seed! This seemed almost incredible to all, especially when he added that no extraordinary care or

dressing had been used in its cultivation; and had not the relator been a man of undoubted integrity and noted accuracy, his account would, I have no doubt, have been discredited. But perhaps the most singular feature in the case was to come; he had not even planted the corn—it had sprung up from the dung dropped on the spot by a corn-fed ox! Thus this prolific seed had passed through the organs, but escaped the process of digestion. This circumstance was viewed at the time as a most singular coincidence; but, strange to say, of the many that were acquainted with the facts in the case, no one, so far as I know, looked upon them in the light of cause and effect.

This case seems to me to go, as far as a single case can, to confirm the novel doctrine of the German, and to justify the trial of the excrements of cattle made liquid, and of their urine also, and perhaps of the guano, for fertilizing seed.

On reviewing this subject in the light we now possess, I cannot but consider it as promising important results to agriculture, and as pre-eminently worthy the attention of every intelligent husbandman. At the hands of the physiologist, too, in connexion with the animal as well as the vegetable kingdom, it seems to me the whole doctrine is worthy of the closest scrutiny; it would not surprise me if in it should be found a clew to the marked dissimilarity of offspring of the same parents, occurring under what appeared to be similar circumstances.

It is the intention of the writer to try the effect of the new process on the *germination* of seeds to some extent; further than this, to test the agricultural value of the new doctrine, his situation is not favorable. It is favorable, however, to the preparation of the chemical solutions or "corn-growing liquids" of James Campbell, an account of which is contained in the Cabinet of 7th month last; and it is his present purpose, in order to facilitate the attempts of others to test their value, carefully to make such solutions, and to furnish them to applicants at a barely remunerating price.

PAUL SWIFT.

PHILADELPHIA, 8*th month* 30, 1844.

No. 26.

From the Indiana Farmer.

VEGETATION OF SEEDS.

Among the important questions which interest the gardener, is that which relates to the proper time for putting his seeds into the ground. It is well known that different seeds require very different temperatures to effect their germination; and that some plants flourish, where others would speedily perish. While the reindeer moss thrives best on the snow-capped mountains of Norway, other plants are found spreading themselves over the burning surface of the island of Tanna. Familiar as these truths are, I believe no experiments have been heretofore made to ascertain the precise temperature most favorable to the germination of different seeds. To give a starting point to this question, and to enlist others in the investigation, I proffer the subjoined table for publication. It is the result of

numerous experiments which I made in the years 1839 and 1840. My object was to determine what temperature at noon was most congenial to the vegetation of the different seeds which I subjected to experiment. For this purpose, I planted the seeds at various periods; noting the state of the thermometer every day until the plants appeared above ground. These experiments being repeated, and in every instance giving very nearly the same average temperature when the period of germination was the same, has led me to assume as correct the following propositions:

1. When the temperature at noon is given, (other things being equal,) the time necessary for the development of a seed may be ascertained.
2. If the period of germination be given, the meridian temperature of the country during the period may be determined.
3. Some seeds require a much higher temperature than others to vegetate.
4. When the seed fructifies in the same year in which it is planted, the proper time for putting it into the ground is when the meridian temperature is such as to produce vegetation in the shortest period.
5. An increase of temperature beyond a certain point does not expedite the vegetative process.
6. A complete table of the kind proposed would be applicable to all parts of the world.

The letter *s*, in the subjoined table, signifies that the seeds were soaked in water for ten or twelve hours previous to planting them.

Table.—When the average meridian temperature in the shade is—

Degrees.		*Days.*
62	Lima beans, s, require	20
76	do s, "	7
88	do s, "	7
51	peas, s, require	19
59	do s, "	13
74	do s, "	11
80	do not soaked, require	14
60	do Bishop's early, s, require	10
62	do do s, "	8
55	radishes, s, require	12
56	do s, "	11
58	do s, "	9
60	do s, "	7
62	do s, "	6
67	do s, "	5
70	do s, "	3
60	turnips, not soaked, require	9
60	pepper grass, " "	6
67	do " "	5
62	onion seed, s, require	15
77	do s, "	9
61	nasturtium, s, "	15
76	do s, "	11
54	drum-head cabbage require	12
60	do s, "	6
75	do s, "	5

When the average meridian temperature in the shade is—

Degrees.			Days.
61	red cabbage, s, require	- - - - -	6
57	early York cabbage, s, require	- - - -	12
61	white dwarf beans, s,	" - - - -	11
76	do s,	" - - - -	9
77	do s,	" - - - -	8
71	white pole beans, s,	" - - - -	13
63	do s,	" - - - -	12
62	black-eyed beans, s,	" - - - -	11
68	do s,	" - - - -	8
62	Irish parsnips, s,	" - - - -	18
61	beet, s,	" - - - -	11
63	do not soaked,	" - - - -	22
67	do s,	" - - - -	8
79	do s,	" - - - -	5
58	cucumber, not soaked,	" - - - -	30
62	do s,	" - - - -	13
76	do s,	" - - - -	5
81	do not soaked,	" - - - -	7
52	tomato	" - - - -	21
61	summer savory	" - - - -	14
65	cauliflower, s,	" - - - -	7
66	do s,	" - - - -	6
63	oyster plant, s,	" - - - -	11
53	celery	" - - - -	24
53	kidney potatoes	" - - - -	42
62	parsley, s,	" - - - -	13
57	egg plant, s,	" - - - -	31
64	do s,	" - - - -	9
64	Spanish water melon	" - - - -	23
76	do	" - - - -	4
59	sage	" - - - -	36
63	do	" - - - -	21
64	angelica, s,	" - - - -	22
81	Chinese corn, s,	" - - - -	11

The foregoing table may be made useful in various ways. It will serve to inform the young gardener when he may expect his plants to appear above the ground; he will discover that, in some cases, he must wait a long time. It also shows clearly the advantage of soaking the seed. Some of the soaked peas, for example, came up in eleven days; while those that were not so treated required fourteen days, even with the advantage of six degrees more heat. The difference is still more remarkable in the beet seeds. A certain writer says, parsley seeds "will seldom vegetate under five weeks;" but he adds: "if soaked twelve hours in water with sulphur, they will come up in less than a fortnight." I have proved by careful experiment that there is no value in the sulphur; simple water answers equally as well as the water with that addition. The Lima bean, lying twenty days in ground of the usual dampness of spring, partially decays; and if it comes up, it seldom matures its fruit. Persons, therefore, living in a latitude whose highest meridian temperature barely reaches 63 degrees, (see table,) should not plant this seed; nor should they do it in any latitude until the noon

temperature attains to 70 or 80 degrees. The month that furnishes this degree of heat is therefore the proper one to plant the beans in. Those who plant earlier will not realize a perfect crop; and, indeed, if much earlier, they will scarcely find one mature pod.

It is obvious that the color and quality of the soil produce a material influence upon the vegetable process. So that if the ground be of a very dark color, or inherently warm, or very moist, or very dry, germination will be more or less rapid, according to the operation of these extraordinary agencies; and, of course, there will be a proportionate deviation from our tabular periods and temperatures. But, in this case, the deviation, I think, would be uniform throughout the catalogue. If any given seed should germinate a few days sooner, in an unusually warm soil, all the other seeds would be proportionably earlier in their growth; so that the ratios mentioned in the table would be preserved. I find, by recurring to my meteorological records, that, at Richmond, latitude 39 degrees 51 minutes, the average temperature at noon of the third month is 53 degrees; fourth month, 61 degrees; fifth month, 68 degrees; sixth month, 75 degrees; seventh month, 77 degrees.

JOHN T. PLUMMER.

RICHMOND, IND.

No. 27—(1.)

From the London Spectator, October 26.

INCREASING THE FERTILITY OF LAND BY ELECTRICITY.

The Tring Agricultural Association held their fourth annual meeting on Friday.

Mr. Gordon described a new method of increasing the fertility of the land—by electricity.

In Morayshire he met with a gentleman who communicated to him many agricultural facts, and informed him that he had recently seen, on the farm of Findrassie, a plat of land which seemed to bear barley and clover as if they were growing on a dung hill; and that that effect was produced by singular means, but easily to be comprehended by persons versed in science. Perhaps, when he mentioned it, they would call him a wire worm; and perhaps they would be astonished if he told them that the most successful agriculturists might be the poachers; for who would deny that they well knew how to lay down wires? [Laughter.] He came among them armed only with a pole or poles eleven feet long, a coil of common wire, and a compass; and with these weapons he trusted he should, in a few minutes, convince them that he could wield an agricultural power not to be despised. But to proceed. He wrote to the proprietor of the farm at Findrassie, near Eglin, (Dr. Forster—not Faustus,) to open, with a lecture on the subject, a large room which he had built for agricultural purposes in the county of Aberdeen. Dr. Forster, however, was not able to do so; but, with a practical liberality which marked him a true agriculturist, he was kind enough to write an account of the subject, which was the novel and surprising one of the influence of electricity and galvanism on the growth of plants as applicable to agriculture.

Many years since, Mr. Forster read in the Gardener's Gazette the account of an experiment made by a lady, which mainly consisted in a constant flow or supply of electricity (to be afforded by a common electrical machine) to proceed from a summer or garden house, and which was diffused, by wire, to a fixed portion of the surrounding ground; and the effect was, that vegetation did not cease in the winter on the spot under the influence of this wonderful power; and that what snow fell during the continuance of the experiment never remained as it did on the rest of the garden around. This impressed Mr. Forster very much, and induced him to place a small galvanic battery in action on a grass plot; and although the power from it was very small, still the effect produced fully confirmed the lady's experiment. This, and other facts which Mr. Forster collected, led him to think that the electricity of the atmosphere (a constant current of which was found to proceed from east to west over over the whole of this earth's surface) might, by some arrangement, be usefully employed in agriculture; for Mr. Crosse, of Taunton, had long since proved that the free electricity of the air might be easily collected by wire suspended on poles of wood, at many feet from the earth's surface—the direction of the wire being due north and south by the compass; and many very interesting and important facts and experiments had been recorded by Mr. Crosse, and many collected from a careful observance of the electricity proceeding from the suspended wire.

Mr. Forster next placed two poles four feet high in his front lawn, which had been recently laid down with chevalier barley and grass, after draining and subploughing it; and over those poles, which were due north and south of each other, he stretched a common piece of iron wire, fixing the two ends of it to stout wooden pins, driven in close to the earth; and on the edges of the plot of eight English poles, and around the edge, which were straight lines, he sunk, about two or three inches beneath the earth, two wires of equal length, the ends of which were fixed and in contact with the two ends of the suspended wire, which were meant not to be too tight, for its contraction, in cold nights, would break it in two, or pull away the fixtures, and thus defeat the object. Mr. Forster formed two of these plots for experiment, measuring eight square poles each, and then proceeded to criticise his work: and, to do so accurately, sought the aid of "Noad's Popular Lectures on Electricity and Galvanism;" and almost the first half hour's perusal showed him that there was such an error in one part of his plan as would effectually defeat his intentions. This was, that the point of a blade of grass or young corn plant has the most extraordinary faculty or power of attracting or appropriating to itself all the free electricity present, at four times the distance that the finest point of metal would or could; so that, when the points of the barley plants should reach one foot high, all the electricity that the suspended wire might before that have collected, and conveyed through the buried wire to the roots of the plants, would be abstracted by the points of the barley; and thus the suspended wire, getting nothing from the air, could not of course supply any thing; by which all the induced electrical influence would cease.

Mr. Forster, therefore, next day placed poles eleven feet high above the surface, with wires, &c., exactly the same, except that the space surrounded by the buried wire was twenty-four poles, English measure. All the results are yet imperfectly known; but these were evident: the bar-

ley plants on the two smaller plots (of eight poles each) soon became darker in color, and grew faster until they had attained to about a foot in height; the darker green color then gradually disappeared; and, at the end of a fortnight after, there was no perceptible difference but in the height of the young barley plants; and even this ceased to be very apparent as the crop advanced. When the barley of the larger or twenty-four pole plot was six inches high, it assumed the same lively dark green, and grew faster than the surrounding unelectrified barley plant; and this difference it maintained up to the last—except that the color, of course, in time became yellow; and it was curious that this change occurred later than in the rest of the crop. The number of stooks or shocks was also greater, and each larger when reaped; the ears from one grain of seed were more numerous and longer; the corn, also, was larger and harder.

To make assurance doubly sure, Mr. Forster fixed to the short four-feet poles of one of the smaller plots pieces of dry pine wood eight feet high, and suspended two wires to them—one at that elevation, and another a foot lower down—and was pleased to find that, after some time, this plot partially resumed its former darker green color. The experiment has also been tried at Liverpool, with great success, on potatoes; the crops being much larger than on the other parts of the land. It was the opinion of those scientific persons of whom he had inquired, that even Professor Liebig was not aware of the application to agriculture of this discovery. It seemed, then, that the meeting was now in possession of valuable details, which were known to very few persons in the whole country. He hoped some gentlemen would try the experiments, and write upon the subject; for he had written to the Royal Agricultural Society to offer £30 for the best prize essay on galvanism and electricity, as applicable to agriculture.

No. 27—(2.)

GALVANIC EXPERIMENTS ON VEGETATION.

BY WILLIAM ROSS.

Sir: At your request, I send a concise account of the few experiments I have made on the application of electricity to vegetables. They have been but few in number, although at present they may be more interesting, from the fact that very recent discoveries have rendered the use of this subtle, mysterious agent, more or less advantageous in many of the arts.

My attention was first called to the subject by reading in some periodical (I believe one of the earlier volumes of the Gardener's Magazine) of an experiment said to have been performed at a dinner given by the Marquis of Anglesea, of the following nature: The statement was to the effect that the seeds of cress (*lapidium sativum*) were sown in a glass vessel at the time the guests sat down to dinner, and that the crop from these seeds was served to them in the salad. The seed was sown in a soil formed of clean sand, mixed with some black oxide of manganese and table salt: the whole was moistened with dilute sulphuric acid, and electricity applied. The manner in which this agent was generated, or used, was not stated; but even without it, we all know that cress seed so treated will germinate

in about three hours, though the seed leaves will not be fully developed in less than five hours after sowing. Cress, when used as salad, is always taken in the seed leaf; and unless we believe that the dinner was prolonged on purpose, the application of electricity must have accelerated the growth in a very rapid manner.

Many observing farmers will, no doubt, have noticed that vegetation proceeds more rapidly after a thunder storm than after one which shows no electrical phenomena; and we find, on examining the various formations of the parts of plants, that they are well adapted for the passage of electricity through them, either from the earth or the atmosphere. Witness the points and serratings, as well as the hairs and down on the leaves—all good conductors, and calculated for affording it a silent and easy passage. That this is the case, any one may satisfy himself by a very simple experiment. Charge a Leyden jar either by mechanical or chemical electricity, (for both are the same, though excited in a different manner;) then stick a wire in the ground near a plant, having the upper end pointed; hold the knob of the jar near, but not to touch the edge of one of the upper leaves, and let the outer coat of the jar be within an inch of the upper point of the wire in the ground. In a few seconds the whole of the charge of the jar will be silently drawn off through the plant, and the outside coating will have received its compensation through the pointed wire from the ground, the equilibrium of the jar being restored without a spark or any other perceptible effort. Were the knob of the jar to touch the leaf, and the outer coating brought within what electricians call the "striking distance," a spark would pass, which, were the plant of a very juicy nature, as the cucurbita tribe, the shock would burst the vesicles, and the plant would die. A ligneous plant, however, will bear very strong shocks, apparently with impunity; yet a repetition would, sooner or later, rupture its vessels also.

My first experiment was on some melon plants, in 1842. Only a few plants escaped the fly; through them I passed a shock from a jar containing a coated surface of fifty inches, (in short, a pint jar;) and the result was, they were all killed the same day. On the afternoon of the same day, I planted some cucumbers, mixed some salt and manganese in the hill, which was moistened with very dilute sulphuric acid, and a shock passed through each hill. On the following afternoon, three out of the four hills were up, and on the next morning the whole were up, with most of the seed leaves spread open; by the 11th day, the plants had two rough leaves; and as the day was very warm and dry, I soaked the hills with water very slightly acidulated with sulphuric acid—about one-quarter of an ounce to a gallon. I then gave some plants in *each* hill a shock, leaving only two in each; and to these I gave a silent charge. Those which received the shock, all died; while the others continued as thrifty as before, till the 24th day, when I moistened the hills with pure water, as they were then beginning to open their blossoms, passed a silent charge through two hills, and left the others. The first few blossoms were all males; no fruit blossoms appeared (or rather opened) until the 28th day, when the four hills were moistened with acidulated water, and a silent shock passed through one hill only, the others having none. I was at this time from home a few days, and on my return I found two cucumbers on the hill which received the last charge, about five inches long and one and a half in diameter, which were cut and eaten. This was on the 37th day after

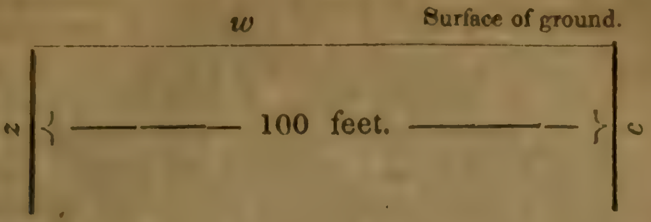
planting, and the flavor could not be said to be any thing different from that of the same variety (white spine) grown in the usual manner. I found that during my absence my boys had taken the other hills under *their* charge, and, in the course of their quick and energetic treatment, they were all killed before I returned. I may remark, that the cucumbers did not run much to vine, no runner having extended so far as two and a half feet; which is rather a strong contrast to the result of the same treatment of pumpkins in the following season. I planted five seeds of a new variety of pumpkins among some potatoes in 1843, giving them precisely the same treatment as the cucumbers had the year before, but only gave them two charges—one at sowing, and one when they had two rough leaves; they were then left to themselves, when, I have reason to believe, one of the plants died; leaving only four, which, from their luxuriant growth, entirely covered the square in the garden (57 feet long, and 30 feet wide) in which they were planted; besides, every day or two, some runners crossing the walks had to be cut off. With all this luxuriance, *not a blossom was seen on them the whole season;* and I may also remark, that, under their shelter, the grubs had destroyed the potatoes, which were not worth digging, as nothing but thin shells of the outside were left.

I also last season (1843) made some experiments with dahlias; but, before the silent charge would pass freely through them, it was found necessary to water the plant all over, if the day had been very dry and hot. I will mention one in particular. On the 10th of September, I took off a cutting about a foot long, planted and shaded it till it struck; on the evening of the 15th it received a silent charge, and on the 23d was nearly three feet high. On that evening it received another charge, and was on the 1st of October almost six feet high, when it received another charge. Its growth was now rapid—owing, perhaps, to several thunder showers between that and the last week of the fair of the American Institute, when it was taken to Niblo's. Its height, including the root which was dug with it, was 11 feet 8 inches, while its diameter at the ground was under five-eighths of an inch. There were then two blossoms upon it, with several blossom buds; the blossoms were small—not quite two-thirds the size of those on the plant from which it was taken.

As I have explained at length these several experiments, and also the mode of giving the shock, I shall now only mention one other experiment of last year on the egg plant, (*solanum melongena.*) On the evening of the 3d of June, I sowed some seeds of egg plant in a glass cup, with the same mixture as used before in the cucumber hills, and passed two smart shocks through it. In the morning most of the seeds had germinated, and were in the afternoon put in the open ground. During their growth, they received three charges, and the fruit was presented at the late fair. As to their size, they were not the largest there, but they were larger than any I saw in my own neighborhood, and also larger than any I had ever before raised from plants forwarded in a hot-bed with much trouble and care in the spring.

This season, my only experiment, as yet, has been with potatoes; and the electricity used is generated by different means from the others, which, until the discovery of Mr. Bain, was not adapted for the practical farmer. Now it is at once the most economical, efficient, and simple to apply, as may be seen by the following experiment. I had potatoes planted on the

6th of May, and, as a first experiment with Mr. Bain's discovery, I procured a sheet of sheathing copper, which is about five feet long, and fourteen inches wide, and cut a piece of sheet zinc the same size as the sheet of copper.



C, in the above diagram, represents the sheet of copper buried in the ground at one end of the rows, and *z* the sheet of zinc buried at the other end of the rows, and *w* is a copper wire, which is attached to both the copper and zinc. The result of this arrangement is, that the two metals form a galvanic battery, being in metallic connexion by means of the wire *w*, and the moisture of the soil completing the galvanic circuit; which last is necessary, before any chemical action takes place. The potatoes were planted in drills; but, as the copper was only five feet long, only three rows could be influenced by it. The potatoes were only once hoed, and, from circumstances, never earthed up. On the 15th of June, some potatoes were taken by the fingers from these rows, varying from one inch to one and a quarter in diameter; and those exhibited at the New York Farmers' Club, July 2d, were about two and a half inches in diameter, and were dug from the same three rows. Some of the adjoining rows were tried, but few of them had potatoes larger than marrow-fat peas—certainly none larger than a boy's marble.

These experiments can only be taken as isolated facts; no more general conclusion can be drawn from them, than that electricity accelerates the growth of plants. This has been observed by many of atmospherical electricity; but it has yet to be determined how, artificially excited, electricity can be made as available to the farmer as it now is to the electro-metallurgist in reducing metals from their ores, or in gilding and plating, or even copying the most delicate engravings.

On a future occasion I may show how a battery may be put in action by the farmer, without any other expense than that for the materials; all which, except the zinc, will last for an indefinite period, as there is no action whatever on the copper while a current is passing.—*New York Farmer and Mechanic.*

No. 28.

From the Agriculturist's Manual.

LOLIUM ITALICUM, OR ITALIAN RYE GRASS.

Specific characters.—Lower paleæ terminated by an awn, or head, which constitutes the most marked distinction between this and *lolium perenne*, the varieties of the latter being all beardless. Botanists, however, agree in concluding that the presence or absence of an awn in *gramineæ* does not constitute a sufficiently permanent character, from its being often caused merely by the effects of climate, soil, &c. Hence, it has been concluded

that the Italian rye grass is only a variety of *lolium perenne.* The Italian rye grass, however, possesses other distinctive characters, which, although they may seem of little consequence in the estimation of the botanist, are, nevertheless, (some of them, at least,) of considerable importance to the agriculturist. Compared with any of the varieties of common rye grass, the *lolium italicum* affords a stronger beard; arrives sooner at maturity; has a greater abundance of foliage, which is broader and of a lighter or more lively green color; grows considerably taller; is more upright, or less inclined to spread on the ground; its spikes are longer; spikelets more thinly set; and, upon the whole, producing a less bulk of seed, which is smaller, has awn, above mentioned, adhering to it, and is generally little more than half the weight per bushel of that of common perennial rye grass, when grown under similar circumstances. Another of its distinguishing characters is, that it is preferred by cattle to any of the common sorts—a fact which has been proved by numerous experiments in various parts of the country; as a confirmation of which, the following instances may be adduced:

"Part of a grass park at Pitfour Castle, Carse of Gowrie, sown down in spring, (1833,) was found to be so much preferred by cattle to the rest, which was sown by common rye grass, that, while the latter produced a number of stalks which flowered and perfected seeds, the former was kept quite bare, and scarcely allowed to produce a single stalk during the whole season; and the cattle, which were kept in a house at night, on being let out in the morning, were observed to go regularly across the whole park, without stopping to feed until they came to that portion occupied by the Italian rye grass." (Communicated by Mr. James Young, land surveyor and valuator, Perth, formerly land steward to Pitfour Castle.)

"In the spring of 1833, an extensive park was laid down at Dalkeith palace, part of which was sown with common rye grass, part with the most approved mixtures for permanent pasture, and part with Italian rye grass alone. The whole was depastured with sheep and cattle, and during the dry weather in July and August, 1835, the stalks or culms of the common rye grass (which were produced in great abundance) flowered and ripened into seed, and assumed a dry, withered-like appearance, until the wet weather set in, in September. The mixture produced a much less quantity of culms, and retained all along a much greener appearance than the last-mentioned portion; and the Italian rye grass produced scarcely any, from their being closely eaten down; while it retained its verdure much better than any of the others, not only during the warm dry weather, but also during the whole of the previous winter. However, from the upright habit of growth which it possesses, the Italian rye grass has rather a bare rooted appearance, and seems better adapted for forming a part of a mixture, than for sowing alone as a pasture grass." (Communicated by Mr. Black, land steward at Dalkeith park.)

"This plant is said to be distinguished from the common rye grass, (*lolium perenne,*) by its larger leaves, by its being of a deeper green, and by the greater height to which it grows. It is usually sown in autumn, as is the general practice with grass seeds in the south of Europe. After the field is harrowed, it is sown at the rate of from 16 to 18 lbs. per acre, and the seed rolled in. In the following autumn the turf is covered like an old meadow, and the crop of the following year is more than double. It may be also sown in the spring. If it be sown with clover or lucerne, its growth

is so rapid that it will quickly choke them. It is eaten greedily by cattle, whether green or dry, and yields 50 per cent. of hay.

"As there is no account of any trial having been made of this grass in Britain, it was an object of some importance to obtain a few seeds or plants of it, for the purpose of observing its character and mode of growth in this country.

"Mr. Thomson, of Banchory, having produced a few seeds of it at the agricultural exhibition at Munich, had the goodness to communicate them to me. About the same time I obtained a small quantity of what was called a new kind of rye grass from Hamburg. These two were sown last spring; and at the same time, for the purpose of comparison, was sown along with them a small quantity of Stickney's rye grass, which is held to be one of the most valuable varieties of perennial rye grass under cultivation. The progress of these plants was carefully observed. There was no difference in the period of their germination, or in appearing above ground; but, in a short period afterwards, the seeds obtained from Italy and from Hamburg both exhibited a decided superiority in their growth over that of Stickney's rye grass; and this superiority was afterwards maintained during the whole of the season.

"The general appearance of these two foreign grasses was the same, they being broader in the leaf, and much more luxuriant in growth than Stickney's rye grass; and, when examined after they came into flower, they were both found to be the same variety of rye grass. It is not known whether this Italian rye grass is a native of Italy or of Germany; neither is it known in which of these countries it was first cultivated. The whole character of this plant, so far as it has been observed, accords precisely with the account in the *Bulletin des Sciences Agricoles;* and although the small scale upon which the experiment was here made did not afford an opportunity of ascertaining how it was relished by pasturing animals, the account obtained from Hamburg precisely confirms that above stated, for it is represented as being softer, more juicy, of a richer foliage, and more relished by cattle than the common rye grass.

"Though the Italian rye grass will be valuable as an early grass, it also retains its powers of growth to a late period in the season. A patch of it which had flowered and ripened its seeds was cut over in the first week in November; and notwithstanding the frosts that we have since had, (occasionally pretty severe for the season of the year, at which period vegetation in plants is nearly dormant,) these plants have put forth new leaves, which at present (24th December) have attained the length of above a foot, showing a superiority to any other grass producing winter herbage.

"This grass, too, is found to be more hardy than the common rye grass; for, in the vicinity of Hamburg, the common rye grass will not stand the winters when very severe; whereas the Italian rye grass withstands the severities of winter, even when sown in September; and, consequently, the plants are young and tender when the frost prevails.

"That it is a perennial grass, too, has been ascertained by the cultivation of it at Hamburg. A few plants in their second year have been sent here from that place; which, though completely checked in their growth by the effects of the sea voyage, were planted about the middle of November, and have now put forth a number of fresh leaves."

From the right honorable the Earl of Lauderdale.

[Communicated by Mr. Thomas Fair Woodheads.]

"Sample of the hay of Italian rye grass, sown without a crop on the 17th of May, 1834, and cut on the 9th of August following, when the seed was found to be perfectly ripe. The field from whence this specimen was taken produced nothing previously, except rushes and other plants indicative of a cold, marshy, moorish soil. In the month of January, 1833, it was trenched and drained, and had about twelve single cartloads of lime given it per acre, with no other manure whatever; and although the produce was not weighed, yet it was reckoned by judges to be superior in bulk to what might have been expected from common rye grass grown on the same extent of superior corn land. Horses were found to eat the hay with great avidity, and in preference to that of the common rye grass and clover. The aftermath being allowed to grow until the 30th of September, was at that period nearly as good as the first crop; when it was eaten down by sheep."

By William McDowall, Esq., of Garthland park.

"Hay of the second cutting of Italian rye grass, 1834, from a field sown in the spring of 1833, and from which two cuttings were also obtained the first season; and also three plants, having each from 70 to 100 stalks; in length, from 15 to 36 inches. The first of these specimens from Mr. McDowall tends to show the perennial nature of the Italian rye grass, combined with its tendency to arrive early at maturity. The others show its productiveness and liability to tiller, or its bushy habit of growth, if not sown too thick."

From Jonathan Richardson, Esq., Ingram Lodge, Lisburn, Ireland.

[Communicated by Mr. Airth.]

"Two specimens of Italian rye grass, sown without a crop on the 4th of May, 1834. The first crop was cut on the last day of July following—average height, 4½ feet; second cut in the end of September—average height of it, 4 feet 3 inches."

By Mr. A. Gowrrie, Annat Garden.

"A specimen of Italian rye grass, cut for seed third week of July, 1834, from a field sown on the 9th of April, 1833, and which ripened two crops of seed that same season. Also, a sample cut from the same field on the 28th of September, 1834; at which period the fourth crop of seed was almost ripe. In order to ascertain the permanency of its duration, the Italian rye grass was allowed to stand for another season, but was found to yield a very small return, (in 1835,) owing to the exhausting effects which the previous ripening of four crops of seed must have had, both on the soil and plants."

No. 29—(1.)

GUANO AND COMPOST MANURES.

Extract from a letter of Dr. C. T. Jackson.

Guano was first introduced into Europe and brought to the United States from certain islands near the western coast of South America. It had been extensively employed as a manure by the Peruvian Indians, and was known to them anterior to the conquest by the Spaniards.

It has within a few years become an important article of commerce, and is sought for on the most remote islands of the Pacific ocean and along the coast of Africa. Thousands of ships are now engaged in transporting it to Europe, where it is extensively used as a manure, and for various chemical and manufacturing purposes. Many have expressed a belief that it would ere long become scarce; if, indeed, it is not destined to be entirely exhausted; for no new supply can be expected when the sea birds which deposite it are destroyed or driven from their customary resting places.

If it should become scarce, so as to considerably increase its cost, it might become an object of importance to manufacture an artificial substitute for it, even if the artificial should cost a little more than the natural guano now sells for in the market. I am satisfied that it is an easy matter to manufacture an artificial guano, possessing all the fertilizing properties of that now brought from the guano islands; and, if it should be required in large quantities, it might be made and sold at as low a price. Perhaps some variations in its composition may serve a useful purpose, by adapting it to peculiar kinds of soils or to the different crops. For instance: if more organic matter is introduced, it may operate better on soils that are deficient in vegetable substances; and it will also better suit a dry climate, if mixed with swamp muck, or peat, which has the property of retaining moisture. Some soils may already have a sufficiency of certain of the salts that are contained in guano; and then they might be omitted, and others which are required may be introduced in their place. Chemical analysis will determine the ingredients in any soil, and indicate the kind of amendment, or manure, that is required. By analysis of the various crops which are usually raised, it will be easy to discover what ingredients these crops remove from the soil, and, if it has become barren, what will be required to restore it to fertility.

Let us take, for instance, an example calculated by my friend, Mr. Owen Mason, of Providence, R. I., who estimates the saline contents of the crops raised by Mr. Adam Anthony, of Providence, R. I., from a field cultivated eight years.

The quantity of salts in these crops he states to be as follows:

	Pounds.
Potash	424.92
Soda	131.92
Lime	532.88
Magnesia	64.08
Alumina	5.96
Silica	390.40
Sulphuric acid	113.88
Phosphoric acid	108.12
Chlorine	58.64
	1,830.80

"It is doubtful," says Mr. Mason, "if the cultivator ever suspected that he carried to his barn two casks of potash, one cask of soda, two casks of lime, a carboy of oil of vitriol, a large demijohn of phosphoric acid, and a variety of other matters contained in his fourteen tons of fodder, which were as certainly stowed away in his mows as if they had been conveyed thither in casks and carboys." This statement will perhaps serve to give some idea of the enormous quantities of saline matters that are removed from the soil by the crops ordinarily raised. When the crops are eaten on the farm, and the manure produced therefrom is returned to the soil, there is established a continued circulation of those ingredients which would be lost if the crops were removed and sold; or, if animals are raised on the farm and sold, they carry off a part of the farm in the form of phosphate of lime composing their bones, and in the salts which enter into the composition of their various solids and fluids.

Tobacco, being an article generally sent abroad, is said to exhaust a soil. Now, if this is the case, (as I understand it is,) by knowing what the plant carried away from the soil, and restoring it again, we should reclaim it from barrenness. The same remark will apply to other crops that are removed and sold.

Let us see, now, what ingredients are found to exist in natural guano from the coast of Peru, and see how far they will go towards restoring the saline matters to the soil. The following is an exact analysis of Peruvian guano, by Vœlcke. (See *Bulletin Universal de Geneve* for November 17, 1841.)

Urate of ammonia	9.0
Oxalate of ammonia	10.6
Oxalate of lime	7.0
Phosphate of ammonia	6.0
Phosphate of ammonia and magnesia	2.6
Sulphate of potash	5.5
Sulphate of soda	3.8
Muriate of ammonia	4.2
Phosphate of lime	14.3
Clay and sand	4.7
Undetermined organic substance, one-eighth of which is soluble in water; Soluble salts of iron and water	32.3
	100.0

In this analysis, the nature of the organic substances (amounting to 32 per cent.) was not ascertained; and believing that it was important to ascertain their nature, an analysis was undertaken by one of my pupils, in order to discover them; and they were found to consist of the usual organic acids of fertile soils, combined with bases, and principally with ammonia. They proved to be the crenic, apocrenic, and humic acids, and extract of humus—substances which enter the roots of plants by absorption, and are doubtless assimilated by their peculiar action. The salts in guano undergo changes in the soil, the urate of ammonia soon being converted into the carbonate of that alkali; therefore, we may replace the urate in an artificial

guano by carbonate of ammonia, or, still better, by the humate or apocrenate of ammonia; both of which are permanent, and are soluble in water.

I observed that the European chemists who had given formulas for making artificial guano had admitted the vegetable organic matters, and that the artificial compound rarely proved equal, in fertilizing properties, to the natural. With a view to test the questions as to the influence of the vegetable organic acid compounds, I made various kinds of artificial guano; and that which proved to be the best contained a considerable proportion of them. The following is the formula of the best kind:

				Estimated cost in the large way.
	Lbs.	*Cts.*		*Cts.*
Phosphate of lime (burnt bones)	15	at ½	per lb.	7½
Carbonate of ammonia	10	" 6	"	60
Phosphate of soda	10	" 4	"	40
Sulphate of magnesia	6	" 3	"	18
Muriate of ammonia	5	" 9	"	45
Sulphate of soda	3	" 1	"	3
Sulphate of potash	5	" 3	"	15
Nitrate of soda*	5	" 4	"	20
Nitrate of potash	2	" 6	"	12
Humate of potash†	20	" 3	"	60
Apocrenate of ammonia‡	10	" 4	"	40
Oxide of manganese	5	" 2	"	10
Bog iron ore	2	" 1	"	2
Fine silica, *ad lib.*				
	100			$3 32½

I have tried this artificial guano on potted plants, and have found it to be superior to the natural guano of Peru.

It is requisite, in the use of either kind, to employ but a little at a time, and it should be well mixed with earth, and the plants should be watered soon after it is applied. It operates best on poor sandy soil, or yellow subsoil. I have grown healthy plants in pulverized quartz, using only this guano and water, while the plants would not thrive when I tried them in the pure quartz with water alone. I have grown clover, wheat, oats, rye, barley, Indian corn, beans, peas, and many other plants, in a weak solution of the organic salts, like those introduced in this guano, and they were of a dark rich green; while those grown in clear water were pale and sickly, and soon died. It was noticed, as has been remarked by De Seure, that the color of the solution in which the plants were grown gradually diminished, proving its absorption by the plants.

Those who carry on farming in a large way cannot have time for nice chemical experiments; and if artificial guano is manufactured, it must be made in large chemical establishments near cities, where the ammoniacal matters of the gas works and from urine may be employed.

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* The operator may use nitrate of potash (saltpetre) instead of nitrate of soda, with equal effect.

† Humate of potash is made by melting sawdust, or any vegetable fibre, with a very strong solution of caustic potash in an iron pot.

‡ Apocrenate of ammonia, for this mixture, may be made by saturating peat, or swamp muck, with a solution of carbonate of ammonia; when the whole may be mixed with the other ingredients.

The farmer may, however, gain much by attending to the advice of chemists, for they can teach him to save much that is now too often wasted. He may by knowing that a mixture of 100 pounds of peat or swamp muck and 20 pounds of ground gypsum, or plaster of Paris, will absorb an enormous amount of urine, without being in the slightest degree offensive; and by this operation he may not only consolidate a valuable manure, but at the same time do a public service by removing a nuisance. He has only to place his casks in certain places, and he will soon have them charged with ammoniacal salts, which will prove highly fertilizing to the soil. The same mixture will remove all unpleasant odors that are given out by vaults, and will consolidate their ammoniacal matters in the states of humate, apocrenate, and sulphate of ammonia; while the lime, formerly a sulphate, will be converted into a carbonate of lime, and will serve as a useful manure.

A hundredweight of this mixture of peat and ground plaster will consolidate, in an inodorous form, all the urine from four persons for a year at least; and this compost contains, besides the above-mentioned ammoniacal salts, all the phosphates, sulphates, and hydro-chlorates which are contained in urine. The liquid manures of the stalks may be economized in the same way. The farmer who happens to live where fish can be obtained abundantly need not purchase guano; for he can obtain it before it has passed the intestines of birds, and, by a little management, may consolidate and preserve all the ammoniacal fumes, which the slovenly farmer allows to escape, so as to contaminate the pure sweet summer breeze with an abominable stench. Let him then mix his fish with swamp muck, peat, wood scurf, or any decomposed vegetable matter, sprinkling in a little ground gypsum, to take up the gases after putrefaction has begun. He may hasten the process by mixing in recently slaked lime; and, quickly covering the heap with peat and gypsum, he may keep in the ammoniac, and have an almost inodorous heap of valuable compost. If to this he adds a little nitre or nitrade of soda, and a little sea salt, he will have a very good substitute for guano, without the aid of sea birds of tropical climes.

In the interior, the farmer should make all his dead animals, and the refuse of the slaughter house and tannin, into a similar compost. He may supply the place of fish bones by mixing in ground or burnt horn piths and bones of animals. These hard substances are best converted into powder by following a method suggested by Mr. Levi Bartlett, of Warren, N. H., who breaks the bones and horn piths into peices with an axe, and then boils them in the refuse liquors of potash works until they fall to powder; after which, the whole bony matter and the liquid are thrown into the compost heap. A mixture of sulphate of potash and caustic potash lye will effect the entire decomposition of bone, phosphate of potash and sulphate of lime resulting; besides which, a quantity of soap is formed, and the oily and gelatinous matter of the bones is a good manure. These are all good articles for the compost heap; and if farmers generally paid more attention to the principles of chemistry, they might manufacture all the manures they require, and waste but little of those things which are required to fertilize the soil.

Very respectfully, your obedient servant and friend,

CHARLES T. JACKSON.

Hon. HENRY L. ELLSWORTH,

Washington, D. C.

No. 29—(2)

RULES FOR APPLICATION OF GUANO.

1. If intended for drill husbandry, or to be used in the hill, it should be mixed in the proportion of 1 part guano to 4 or 5 parts of woody earth, or mould, or any other fertile earth, or thoroughly decomposed manure—or 1 part guano, 1 part ashes, and 3 parts rich mould or well-rotted manure.

2. It is best, for the above purposes, not to let the mixture come in immediate contact with the seed.

3. For broadcast application, it may be sown as plaster is, after it shall have been reduced into powder, either by itself, or in compost, as prescribed in rule No. 1. Whether used alone or in compost, it should be sown and harrowed in after the crop may have been sown and ploughed in.

4. It may be sown in compost after a crop may have come up.

5. It is a good and highly fertilizing manure for all descriptions of crops, whether grain, grass, or roots; and, if properly used, will not only increase the quantity of the product, but improve the quality also.

6. For root crops, 200 pounds used in compost, as named in rule No. 1, is sufficient for an acre of ground; and the same would be sufficient for an acre of corn, if used in the drill or hill.

7. For wheat, rye, oats, barley, tobacco, or any of the grass crops, from 200 to 300 pounds, according to the quality of the land, will be found sufficient for an acre.

8. It should, if possible, always be applied in *wet* weather, and covered lightly with either plough or harrow. Where neither of these modes may be practicable after sowing guano, the roller should be applied.

9. In applying it to old meadows, or meadows which may have been set for some time, it should be harrowed in and then rolled.

10. If convenient, plaster may be very advantageously used with it, in the proportion of 1 bushel of plaster to 100 pounds of guano.

11. In applying it to grass lands and meadows, the month of April would be the most suitable period, as a great object is to dissolve it, in order that its virtues may promptly come in contact with the roots of the plants. It may, however, be used at any *wet* season.

12. Any compost made of guano should remain a few days before being used.

13. Where liquid applications of guano may be desirable, as on tobacco beds, or in gardens, 1 pound of guano dissolved in 4 gallons of water will comprise a most enriching manure. The sediment remaining, if any, may very advantageously be used with an equal quantity of water as at first used.

14. Where plaster cannot be obtained to incorporate with the guano, a most excellent substitute may be found in pulverized charcoal; to be used in the same proportion as plaster.

No. 29—(3.)

VOGEL ON GUANO.

American Institute, *July* 29, 1844.

Dear Sir: Guano has become an interesting subject, and it is necessary for us to gain all possible information about it, that we may so far help our *noble interest—that of agriculture.*

I find in the *Revue Scientifique* a recent experiment made with guano, by the distinguished chemist Vogel; and I send the following translation of it:

"M. Vogel grew two plants of the *fuchisa fulgens* in separate vases—one manured with guano, the other ordinary culture. That with guano grew with extraordinary rapidity. It had already *leaves and flowers*, while the other had not a *bud*.

"He analyzed these plants; and 100 parts of the guano plant, when dried at 100 degrees of Fahrenheit, weighed 13.04, while that without the guano weighed 19. The first contained, then, 86.06 of water, and the other 81. The guano then gained for the plant 5.06 of water more than the other. This explains its rapid growth. One hundred parts of the guano plant gave, after combustion, 6.02 of ashes, while 100 parts of the other gave 7.05 of ashes.

"The ashes of the plant manured with the guano contained (all other things being equal) 41.05 of matter soluble in water, and that without guano 22 per cent. These matters consisted principally of alkaline carbonates mixed with the chloride of sodium and sulphate of potash. The presence of these soluble salts contributes to explain the rapid and almost sickly growth of the plant manured with guano.

"The quantity of phosphate in the two plants shows a difference of only 0.02 of 1 per cent.; but as to the lime and magnesia, the difference is remarkable. The ashes of the plant without guano contained 40.02 per cent. of the carbonate of lime, and 23.07 per cent. of the carbonate of magnesia; while the ashes of the other plant, manured with guano, contained 25.04 per cent. of the carbonate of lime, and 27.01 per cent. of the carbonate of magnesia. This difference is explained by the considerable quantity of ammoniacal magnesian salt which is contained in guano.

"In conclusion, guano, which is rich in soluble salts, especially alkaline carbonates, causes the plant to absorb a considerable quantity of water, and diminishes almost one-third its absorption of lime."

So far M. Vogel. It does appear to me, from all I have yet been able to learn, that guano will be found to be the greatest fertilizing power on the very poorest land. Its stimulus will prove far less useful on soils already of some fertility.

However, our business is to try all things, and hold fast by that which is good.

I am, dear sir, yours, truly,

H. MEIGS,
Secretary of the Farmers' Club.

THADDEUS B. WAKEMAN, Esq., *Cor. Sec.*

No. 30.

DISINFECTION OF FECAL MATTER—ITS CHEAP AND IMMEDIATE CONVERSION INTO MANURE.

Agriculturists are acquainted with the powerful properties of poudrette manure. The expense of its preparation and transport has hitherto limited its use to gardens and farms in the neighborhood of its manufactory.

From the facts contained in the following letter, laid by M. Dumas before the French Institute in July, and which we commend to the serious attention of our readers, we learn that this potent auxiliary of production may be made quickly, and at a trifling cost, on every farm. The disinfecting agent used is the sulphate of iron, or the copperas of the shops, which can be purchased at $1 37½ the hundred pounds. Should the practice of using it for this purpose become general, it is evident a great addition will be made to the resources of agriculture, particularly in the neighborhood of towns and villages. There is one application of the solution of copperas, not alluded to in the letter, which we would suggest to those who shall make a trial of it: we mean its application to the ordinary dunghill. If each new layer added to a manure heap were sprinkled with copperas water, much, if not all, that most valuable element, the ammonia, (which is now lost by its volatility,) would be converted into a fixed salt, and thus saved. We suppose, of course, that the double decomposition which ensues on the addition of sulphate of iron to human excrement, would take place equally in the farm yard, a fact easily determined by experiment.

T.

[Translated from the *Moniteur Industriel* of July 11, for the Cultivator.]

Sir: In experimenting upon the simplest and most economical practical means of saturating the carbonate of ammonia of fecal substances, I have ascertained that sulphate of iron is to be preferred. This salt, in small crystals, and of the commonest quality, may be had for 8 or 10 francs the quintal metrique, [220½ pounds avoirdupois; in Albany, copperas is sold at from $1 37½ to $1 75 per 100 pounds,] and is more easily transported and managed than acids; which may occasion accidents in unpractised hands.

But sulphate of iron offers another remarkable advantage, which must secure for it a preference. The noxious and disagreeable effluvium exhaled by fecal substances proceeds chiefly from the volatilization of carbonate of ammonia and sulphuretted hydrogen gas, which has often been fatal to scavengers. If we pour a solution of sulphate of iron into fecal matters, a double decomposition immediately takes place; the sulphuric acid of the sulphate combines with the ammonia, converting it into a fixed salt, and the iron forms, with the sulphur, sulphuret of iron. The exhalations of ammoniacal vapor and sulphuretted hydrogen immediately disappear, and the fecal substances lose all but a slight smell peculiar to them, combined with the odor of the little vegetable matter they contain, and are not at all offensive. When these substances are sufficiently liquid, the solid excrements are dissolved in great part; what remains precipitating as a blackish slime.

I obtained this result by treating in the above manner the contents of my house privy. The liquid I used at two degrees of strength, for watering my garden; and the blackish deposite, of trifling volume, which had subsided, was spread upon the beds without occasioning the least inconvenience.

Fecal matters saturated with a solution of sulphate of iron may be transported by day as easily as common manure, without incommoding any body. As they form a very rich manure, they can be carried to greater distances than ordinary dung, and be readily diluted to two degrees, to be used in the liquid form. (By two degrees are meant two degrees of Beaume's hydrometer, which is graduated to 72 degrees generally; the first degree corresponding with water taken as unity, the last representing a liquid of twice

the density of water, so that two degrees indicates a liquid of a density 11.72 greater than water.)

Fecal substances, without previous saturation, lose their carbonate of ammonia, which volatilizes, and are thus deprived of their most energetic fertilizing element.

The greater part of human excrements is lost at the present day, because they are not collected with care, or properly treated, on account of the repugnance they inspire. Yet they are of immense importance to agriculture. The solid and liquid excrements of a man may be estimated at 1.65 pound per day, or 618 pounds per annum, containing 3 per cent. of nitrogen, or 18 pounds—a sufficient quantity, according to Boussingault, to produce 880 pounds of wheat, rye, or oats.

Some portions of a meadow which I watered last year with a solution of ammoniacal salts at one degree, of two quarts to the square yard, still continue to exhibit superior vigor of vegetation, and will yield double the quantity of hay that the unwatered part will give. The result exceeds my expectations; for I did not think that the action of a small quantity of ammonia would continue for several years. I no longer doubt that it will be felt for three years, at least. Ammoniacal salts may thus be easily made to supply the wants of soils where dung enough is not produced; for, if we admit that 880 pounds of these salts, at 5 cents and 3 mills, or about $47, are required to manure two and a half acres for three years, the annual expense would hardly be $16, (about $6 40 per acre,) which would be more than compensated by the increased production.

I am, &c.

SCHATTENMANN,
Director of the Mines of Bouxvillier.

No. 31.

NORWICH, (CONN.,) *June* 29, 1844.

SIR: I have been much interested in the examination of your able and very valuable report for 1843, the first that has fallen into my hands. By its perusal, I am the more convinced of the importance of close observation, investigation, and comparison of facts, in all the occupations of life. I see you have given much attention to manures; and although my business is bleaching and finishing cotton goods, and more immediately connected with manufacturing, yet I have always felt a deep interest in agriculture and horticulture; and, like thousands of others engaged in other pursuits, am looking forward to the time to retire from other business, and engage in it. Hoping that my present business may render some service to the tiller of the soil, I call your attention to the following facts.

In bleaching cotton goods, we boil them in lime—about one cask to three tons of goods; this we do to extract or kill the vegetable and other oils got into them in the process of manufacturing; after boiling from twelve to to fifteen hours to remove the excess of chlorine and sulphuric acid, they are again boiled in one hundred and fifty to one hundred and eighty pounds crude soda (or soda ash, as it is called in market) to the three tons of goods, for ten or twelve hours; then the spent lye is drawn off, as before. Now, the most, if not all bleachers, make little or no use of this spent lye. Supposing that a liquid so highly

charged with alkali, vegetable and other matter, from the cotton goods, would be worth something for manure, I have had a pit dug of about eight hundred square feet, and three to four feet deep; filled it about half full of soil, into which I have run all the spent lye from both ash and lime boil, until it has become fully impregnated; so that, in digging it over, it smells very much like hog manure.

I have had no time or opportunity to try its effect on different kinds of soil; neither have I found any person engaged in agriculture, who was willing to make a fair trial of it. The only trial I have ever seen, of any kind, was on a small lot, three-quarters of an acre, elevated gravelly land, and somewhat arid soil. The lot was divided between three tenants for a garden, equally. The first manured his portion with common barn-yard manure; the second, who had the middle garden, used the soil impregnated with spent lye; the third used little or no manure of any kind. The season was very dry; the gardens of the first and third suffered severely—so much so, as hardly to pay for cultivating. A corn field, on the same kind of soil, near by, was very much injured; while the garden manured with the impregnated soil did not suffer any. Vegetation did not progress as rapidly as on the other lot, yet the growth was healthy. Sweet corn, which mostly covered the second lot, was of a deep green; the leaf did not roll, and showed no sign of being affected by the drought; it furnished a fair return of green sweet corn, until cut off by the frost in October.

What would be the effect on different soil, or in different modes of applying it, I have no means of judging; but should take pleasure in furnishing any person who would make a fair trial of it, without charge. If it has value as a manure, it is important to be known, as a large quantity can be furnished in New England at small expense. I have made an estimate, from my knowledge of the bleaching business in New England, and am confident that I am safe in saying that there are more than six thousand five hundred casks of lime used yearly in bleaching cotton goods alone, and a much larger quantity is used by the paper makers in bleaching rags; that the bleachers of cotton goods in New England use more than one million two hundred and fifty thousand pounds of crude soda, or soda ash, yearly; the spent lye of which I think almost all is wasted.

One word about soda ash. It has very generally taken the place of potashes. I think it was introduced among bleachers in this country in 1835, by James Lee, Esq., of New York; since which time, it has also been largely introduced into use among glass makers and soap makers. As it is an imported article, I should think it worth the effort to learn the mode and cost of production.

Please excuse me for drawing so largely on your time and attention; and believe me, yours, very truly,

MOSES PIERCE.

Hon. H. L. Ellsworth.

No. 32.

MILL FOR GRINDING BONES.

Keeseville, *12th month* 16, 1844.

Friend: In answer to the inquiries in thy letter, the construction of the mill is very simple, but must be very strong; all cast iron—about seven

feet square it will take on the ground floor, and not above two feet high. The power is so irregular, that it is difficult to say, and it depends on the man feeding the mill with bones; a water wheel of 6 horse power is the most suitable.

The cost of the mill ready for work is a material object. In the fixing of it, the expense depends on whether it is moved by an engine, water wheel, or animal power. Bones crushed are the best manure that is laid upon land. I have seen it applied to all the soils we have in England; and it always answered, both to graze and plough in pasture land. You may, the second year, double your stock, and it will continue so for forty years or more. We set on 120 bushels to the acre. Our measure is more than yours, as 8 to 5. Any farmer may double and treble his stock, both winter and summer, if he will drain his land, and cover it with ground bones. Any quantity may be applied to the acre—6, 8, or 10 bushels; if pasture, it must be rolled in when sown.

The cost of mill, about £60 or £70, English money.

Any further information will be given when requested.

From thy friend,

PETER EASTWOOD.

No: 33—(1.)

From the New Genesee Farmer.

FATTENING ANIMALS.

If a person, ten years ago, had said any thing about fattening animals scientifically, he would have been much ridiculed. Still, there is such a thing as applying science to making pork or beef.

It has long been known that certain kinds of food would make an animal fatten very fast, while others would only keep them thrifty. The analysis of the various grains and articles of food used shows the reason, and demonstrates fully the importance of a knowledge of the elements it contains. To enable the readers of the Farmer to judge for themselves, I have prepared a table, compiled from various books and papers, showing the flesh-forming principle and the fat-forming principle in some of the leading articles used for animal food:

Contents of 100 pounds.	Flesh-forming principle.	Fat-forming principle.
Peas - - - - -	29	51½
Beans - - - - -	31	52
Oats - - - - -	10½	68
Barley - - - - -	14	68
Hay - - - - -	8	68
Turnips - - - - -	1	9
Potatoes - - - - -	2	24½
Carrots - - - - -	2	10
Red beets - - - - -	1½	8½
Indian corn - - - - -	12¼	77

By this table, it appears that there is a great difference in the capacity of the different kinds of food to form flesh or fat. Beans, for instance, contain the most of the flesh-forming principle, corn nearly the least; while, on the other hand, corn possesses the largest amount of fat-forming principle of any grain grown. *Corn contains about 9 per cent. of oil.* The analysis of the chemist agrees with the experience of the farmer. For we all know that any animal will grow rapidly on peas, oats, and barley; but that they will fatten much faster on corn. By mixing the food, cooking, and fermenting, so that it will be in the best possible state to assimilate itself in the stomach, the farmer can apply his feed to the best advantage. If he wish to promote the growth, feed less of corn and potatoes; if he wish to fatten fast, give a greater proportion of corn.

But we learn another important fact, viz: the fatting principle is in proportion to the oil contained in the article fed. This we know also by experience; for hogs which feed on nuts, especially beech nuts, become very fat, and the nuts contain a large proportion of oil. Hence it is in the power of the farmer, by raising and feeding with seeds that contain a large quantity of oil, to fatten his animals much faster than by the old process. Sunflower seeds contain, it is said, 40 per cent. of oil. By mixing and grinding a small quantity of these seeds with other food, it would materially hasten the fattening process.

All food should be cooked, if possible, and fermented. From my own experience, I am satisfied that full one-quarter is saved by that means.

D. L., in the last number, says that the water in which potatoes are cooked should be thrown away, lest some of the deleterious properties of the potato should injure the animals. This is theory against fact; and shows how long a popular error may go uncontradicted, when the evidence is daily before us. I have fed hundreds of bushels of boiled potatoes to hogs, and always mashed them up in the water in which I cooked them, and never yet saw any bad effects.

Finally, observe the following rules:

1st. Keep your animals warm and quiet.

2d. Prepare the food, so that it will easily digest.

3d. Mix the food, and remember that the more oil in the food, the faster the animal will fatten—though too much might make the meat soft; and much time and money will be saved. P.

No. 33—(2.)

From the Cultivator.

COMPOUND FOR FATTENING CATTLE.

Flax seed and oil cake have long been considered very valuable for fattening cattle. The English farmers prize these articles highly, and great quantities are imported and used in the British islands. Oil cake is even carried from this country to fatten English beef. One great advantage which the English farmer thinks he derives from the use of it, is the improved quantity of the manure; and this is considered of such consequence, as to balance a large portion of the expense of the cake. Flax

seed or linseed oil has likewise been sometimes used, mixed with bran, &c., for fattening animals; and the effect has been a very rapid gain. We have occasionally used flax seed for cattle with good advantage, by boiling it, and mixing with meal, cut hay, &c. We recollect the practice of one man, in particular, who, more than twenty years ago, was considered to have great success in fattening cattle. He boiled a quantity of ground flax seed, or, instead of that, pulverized oil cake, with potatoes, and scalded in meal, (either from barley or corn,) in such quantity, that, when the mixture was cold, it could be cut in pieces, and in that shape was given to the cattle while they were in their stalls.

In the third volume of the American Farmer is an article by Nathan Landon, of Litchfield, Conn., on the subject of feeding cattle with cut straw, oil cake, and flax seed. He says he fattened an ox and a three year old heifer, with less expense even than that of common keeping, by the following process. He says: "I boiled about two quarts of flax seed, and sprinkled on to cut straw, (which had been previously scalded and seasoned with salt,) together with some oil cake and oat meal, working them together in a tub with a short pitchfork, till the whole became an oily mush. I fattened the heifer first; she was of ordinary size, and in good order to winter. I gave her about three pecks, (of the mixture,) which she ate voraciously; and in the course of four days, when the seed was gone, she was visibly altered. I fed her regularly in that way about two months, in which time she had eaten about one bushel of boiled flax seed, with the other ingredients in proportion. When she was butchered, she weighed 584 pounds, 84 pounds of which was tallow. She would not have sold, before fattening, for more than $16. I sold two quarters of her beef for $18 13. She cost me not more than $10, exclusive of the hay and straw she ate, which was chiefly scalded as above. On the 1st of February I began with the ox. I fed him about three months, but not altogether so well as I did the heifer. He digested about one pint of boiled flax seed a day, prepared as above, which, I suppose, formed half the fat in these two cattle. The ox was short, measured (girthed) seven feet two inches; and, when killed, weighed 1,082 pounds, and had 182 pounds of tallow. He cost me, while fattening, twenty-five cents a day; he had previously cost me thirty-five cents. My nett gain in fattening these two cattle was more than all I have cleared before in fattening oxen and cows in fifteen years. This is owing, I think, chiefly to the use of flax seed. I never fattened cattle that appeared so calm, so hearty, and digested all their food with so much natural ease and regularity as these. I kept my cows in the same way in the month of March, for one-third the expense of hay. It makes excellent milk and butter."

We have lately seen frequent recommendations of an article used in England for fattening cattle, called "Warnes's compound." Sir Charles Burrell, in a letter published in the Farmer's Journal, gives an account of the mode of making this celebrated compound, from which we gather the following. It is said to be a very economical and efficacious food:

1st. Let a quantity of linseed be reduced to fine meal; that is to say, let every seed be thoroughly broken. 2d. Put about 156 pounds of water into a copper, and let it boil. 3d. Stir into the water, quickly, 2 pounds of the linseed meal, and let it boil for about five minutes. 4th. Let 63 pounds

of barley or bean meal be sprinkled upon the boiling mucilage by the hand of one person, while another as rapidly as possible stirs and works it in. The whole will now have assumed the form of a thick mess of pudding. The fire should be put out, and in a short time the food may be given to the cattle. When cold, the compound should be perfectly stiff. Many farmers put it into moulds, like those used for bricks, while hot. The compound is generally given in small quantities at first, and increased at pleasure. For the first week, 5 pounds or 7 pounds per day; when, according to the size of the animal, and quality of other food given, the quantity may be increased to 14 pounds, 21 pounds, or 28 pounds per day. To make cattle compound with potatoes or white carrots, nothing more is required than, after having been properly steamed or boiled, to move them from the vessels, as hot as possible, into a trough; then sprinkle some linseed meal upon them, and knead the whole into a mass with the rammer. The compound may be put hot into the moulds, and made into cakes, or used from the trough. Less labor will be required, if the roots are removed from the cooking vessels in small quantities, and incorporated with the meal. The proportions must be left to circumstances, and to the cost at which cattle are intended to be fed. The effect of giving only one pound of linseed meal per day to a bullock, when incorporated with potatoes or carrots, will soon become visible; but, if a pound or two more were added, the animal would fatten at a rate which those alone who watched the proceedings could believe.

No. 33—(3.)

From the Cultivator.

NATURE OF FOOD, AND THE RELATIVE VALUE OF VEGETABLES AS FOOD.

It seems to be generally conceded, at the present time, that the principal value of any food, for the purpose of nutrition, is dependent on the azote or nitrogen it contains. Professor Liebig, Mr. Madden, Professor Johnston, and others, in the main, agree on this point, as do Boussingault and Bechstein. Professor Liebig says: "The substances of which the food of man is composed may be divided into two classes—*nitrogenized* and *non-nitrogenized*. The former are capable of conversion into blood; the latter incapable of this transformation. The former may be called the *elements of nutrition;* the latter, *elements of respiration*." Parts of the former are derived from vegetables, and are as follows: vegetable fibrine, vegetable albumen, and vegetable caseine; to these are to be added animal flesh and animal blood. Parts of the latter, or the elements of respiration, are derived from both animals and vegetables, and are as follows: fat, starch, gum, cane sugar, grape sugar, sugar of milk, and some few other products. Liebig has demonstrated that the nitrogenized constituents of vegetable food have a composition identical with that of the constituents of the blood; and that no nitrogenized compound (the composition of which is different from fibrine, albumen, and caseine) can support the vital process of animals. As a matter of practical utility to every farmer who keeps animals, we

give from Boussingault the following table, exhibiting the relative value of different kinds of foods, calculated on the amount of nitrogen they contain; or, in other words, on the quantity of vegetable fibrine, albumen, and caseine, they will furnish to the circulation:

Articles.	Amount per cent. of solid matter.	Amount per cent. of nitrogen.	Value compared with hay as 100.
Hay from red clover in flower -	83.4	1.76	60
Hay of vetches - - -	89	1.41	74
Lucerne hay - - -	83.4	1.35	75
Common hay - - -	88.8	1.04	100
Green clover - - -	—	.50	208
Potatoes - - - -	7.7	.37	281
Green lucerne - - -	—	.30	347
Carrots - - - -	12.4	.30	347
Wheat straw - - -	80.7	.20	520
Barley straw - - -	89	.20	520
Oat straw - - - -	79	.19	574
Rye straw - - - -	87.8	.17	611
Turnips - - - -	8.2	.17	612
Beans - - - -	92.5	5.11	20
Vetches - - - -	85.4	4.37	24
Kidney beans - - -	95	4.08	25
Lentils - - - -	91	4.00	26
Yellow peas - - -	83.3	3.40	31
Wheat flour - - -	87.7	2.27	46
Wheat grain - - -	89.5	2.13	49
Rye - - - -	89	2.04	51
Oats - - - -	87.6	1.96	54
Barley flour - - -	87	1.90	55
Barley grain - - -	86.8	1.76	59

In this table, Boussingault has taken good common hay at 100 as the standard. Thus, 60 pounds of good hay from red clover in flower, is equal in nutriment to 100 pounds of common hay, 281 of potatoes, or 520 of wheat or barley straw. The leguminous plants—such as the beans, vetches, lentils, and peas—afford the most nitrogen, and every farmer knows they rank deservedly high in the scale of nutrition; still, as they are destitute, or nearly so, of the phosphates required for the formation of bone, experience proves they are the most useful, when fed in connexion with some of the cerealia or grains. We believe that most farmers will find that their experience in feeding animals agrees very well with the estimates of the table. Thus, in soiling 208 pounds of green clover, or 347 of green lucerne, will be found equal to 100 pounds of hay—a result which few will doubt who have made experiments in this mode of feeding. Forty-six pounds of wheat flour are equal in nutriment to 281 of potatoes; but the animal would fare better on the potatoes than the flour, as there would be more bulk for the proper distention of the stomach.

No. 33—(4.)

STEAMING FOOD FOR CATTLE.

The following is a portion of the remarks of Mr. Lathbury, an extensive farmer, at a late meeting of one of the English farmers' clubs. We copy from the London Agricultural Gazette:

"With regard to the steaming of food, there were various opinions. The experiments which had been tried seemed to prove that no advantage attended it in the case of grain or roots; and though it was admitted that the steaming of dry fodder enabled cattle to extract a larger portion of nutriment from a given quantity, yet it was doubted whether the cost of the process did not outweigh the advantage gained. He was of opinion, that where the cost could be reduced to so insignificant a sum as by his method, the advantage was great.

"The effect of steaming was not to alter the nature of the food; it did not convert the poor food into rich; its simple effect was to render more of the nutritious part of the food digestible. By bruising grain, every particle was exposed to the action of the juices of the stomach, and cattle could crush the substance of roots and green crops thoroughly with their teeth; but in dry fodder, some part of the nutriment escaped the action of the stomach, because the fibre could not be thoroughly broken up by mastication. By cutting fodder into short lengths, and steaming, it was rendered tender, and made to resemble green food. By steaming, hay and straw might be made more nutritious, and we might substitute a portion of straw for hay, and still keep cattle doing as well as on dry hay alone.

"During the past winter he had 90 head of cattle and horses, and he fed them during the whole time on steamed hay and straw. Up to the 14th of February, he kept all his stock on one-third hay mixed with two-thirds straw. After that, finding his cows get in low condition, he used half straw and half hay, and gave the milking beasts a foddering of hay morning and night. As they calved, he added a pound of linseed to their steamed food. With this diet, his cows grew fast, and got into milk as well as he ever remembered.

"Contrasting his consumption of hay in this and former years, he calculated that he had saved 30 tons. The difference between the price of 30 tons of hay, and 30 tons of straw which supplied its place, reckoning hay at £3 10*s*., and straw at £1 5*s*., would amount to £67 10*s*., while the expense of cutting and steaming amounted to less than £5."

No. 33—(5.)

FEED FOR HORSES.

In the account given by Mr. Stevenson, in the Quarterly Journal of Agriculture, of his experiments respecting the feeding of farm horses, on which he received a premium of ten sovereigns from the Highland and Agricultural Society of Scotland, we find the following statements:

"As to the modes of feeding while the inquiry was going on: 1. The fodder during the winter was wheat straw. 2. During spring, bean straw; none of which was chopped or cut, as the labor was thought to counterbalance the advantage. He places hay first, as the best fodder for the horse;

next, bean straw, when well got in, but it is dangerous when given damp; next, wheat straw; then, oat straw. The grain fed out to the horses was as follows:

"1. Three horses fed on bruised oats, (15 lbs. daily,) with 42 lbs. of Swedish turnips, also daily.

"2. Two horses fed on a mixture of bruised grain, of which two parts were oats, one part barley, and one part beans; also, Swedish turnips 42 lbs. daily.

"3. Three horses fed on the same mixture; two feeds given raw and one feed boiled—the boiled portion unbruised; also, 42 lbs. of Swedish turnips daily.

"4. Two horses more on the same mixture, all boiled, and 42 lbs. of Swedish turnips daily.

"5. Two horses fed on boiled Swedish turnips, with one feed of 5 lbs. of the bruised mixture daily. These horses consumed about 150 lbs. daily, each, of Swedish turnips. The ages, weight, &c., as well as results, are given in the table," (which we here omit.)

Mr. Stevenson remarks that those horses which were fed on bruised oats were evidently less energetic than the others. Two of them (Nos. 1 and 2) performed less work, were dull in the yoke, and their coats looked unhealthy. Those on raw mixed grain were the most energetic. Variety of food seems to have a beneficial effect—an opinion corroborated by the observations of Liebig and others. Those on boiled food, whether turnip or otherwise, showed a healthy, glossy coat. Their perspiration did not seem more abundant than usual, with the exception, perhaps, of those fed on boiled turnips. Those on boiled turnips consumed more straw; they scarcely ever tasted water. They are also said to have had a quicker step, and performed more labor.

In regard to cost, he says the results are in favor of boiled turnips, with one feed of bruised grain.

No. 33—(6.)

INFLUENCE OF HEAT IN FATTENING ANIMALS.

The degree of warmth in which the animal is kept, or the temperature of the atmosphere in which it lives, affects the quantity of food which the animal requires to eat. The heat of the animal is inseparably connected with its respiration. The more frequently it breathes, the warmer it becomes, and the more carbon it throws off from its lungs. It is believed, indeed, by many, that the main purpose of respiration is to keep up the heat of the body, and that this heat is produced very much in the same way as in a common fire, by a slow combustion of that carbon which escapes in the form of carbonic acid from the lungs. Place a man in a cold situation, and he will either starve, or he will adopt some means of warming himself. He will probably take exercise, and by this means cause himself to breathe quicker. But to do this for a length of time, he must be supplied with more food; for not only does he give off more carbon from his lungs, but the exercise he takes causes a greater natural waste also of the substance of his body.

So it is with all animals. The greater the difference between the temperature of the body and that of the atmosphere in which they live, the more food they require to "feed the lamp of life"—to keep them warm, that is, and to supply the natural waste. Hence the importance of plantations as a shelter from cold winds to grazing stock; of open sheds, to protect fattening stock from the nightly dews and colds; and even of closer covering to quiet and gentle breeds of cattle or sheep, which feed without restlessness, and quickly fatten.

A proper attention to the warmth of his cattle or sheep, therefore, is of great practical consequence to the feeder of stock. By keeping them warm, he diminishes the quantity of food which is necessary to sustain them, and leaves a larger proportion for the production of beef or mutton.

Various experiments have been lately published, which confirm the opinions above deduced from theoretical considerations. Of these I shall only mention one by Mr. Childers, in which 20 sheep were folded in the open field, and 20 of nearly equal weight were placed under a shed in a yard. Both lots were fed for three months (January, February, and March) upon turnips, as many as they chose to eat, half a pound of linseed cake, and half a pint of barley, each sheep, per day, with a little hay and salt. The sheep in the field consumed the same quantity of food—all the barley and oil cake, and about 19 pounds of turnips per day, from the first to last, and increased, on the whole, 36 stone 8 pounds. Those under the shed consumed, at first, as much food as the others; but, after the third week, they ate 2 pounds of turnips each less in the day; and in the ninth week, again, 2 pounds less, or only 15 pounds a day. Of the linseed cake, they also ate about one-third less than the other lot, and yet they increased in weight 56 stone 6 pounds, or 20 stone more than the others.

Thus the cold and exercise in the field caused the one lot to convert more of their food into dung; the other, more of it into mutton.

The absence of light has also a material influence upon the effects of food in increasing the size of animals. Whatever excites attention in an animal, awakens, disturbs, or makes it restless, appears to increase the natural waste, and to diminish the effect of food in rapidly enlarging the body. The rapidity with which fowls are fattened in the dark, is well known to rearers of poultry. In India, the habit prevails of sewing up the eyelids of the wild-hog deer, the spotted deer, and other wild animals, when netted in the jungles, with the view of taming and speedily fattening them. The absence of light, indeed, however produced, seems to soothe and quiet all animals, to dispose them to rest, to make less food necessary, and to induce them to store up more of what they eat in the form of fat and muscle.

An experiment made by Mr. Morton, on the feeding of sheep, shows the effect at once of shelter, of quiet, and of the absence of light, upon the quantity of food eaten, and of mutton produced from it.

Five sheep of nearly equal weight were fed each with a pound of oats a day, and as much turnips as they chose to eat. One was fed in the open air; two in an open shed—one of them being confined in a crib; two more were fed in a close shed in the dark, and one of these also was confined in a crib, so as to lessen as much as possible the quantity of exercise it should take. The increase of live weight in each of the five, and

the quantity of turnips they respectively consumed, appear in the following table:

	Live weight.		Increase.	Turnips eaten.	Increase for each 100 lbs. of turnips.
	Nov. 18.	March 9.			
	lbs.	lbs.	lbs.	lbs.	lbs.
Unsheltered - - -	108	131.7	23.7	1,912	1.2
In open sheds - - -	102	129.8	27.8	1,394	2.0
In open sheds, but confined in cribs	108	130.2	22.2	1,238	1.8
In a close shed in the dark - -	104	132.4	28.4	880	3.1
In a close shed, but confined in cribs	111	131.3	20.3	886	2.4

No. 34—(1.)

From Ure's Supplement of the Arts and Manufactures.

OILS, &c.

The numerous uses of unctuous oils give importance to their preparation as articles of food, or for burning in lamps, and for the manufacture of soaps, &c. The seeds most productive of oil are those of colza, a species of cabbage, (*brassica arvensis*,) rape, mustard, sesamum, poppy, linseed, hemp, and beech mast. Nuts afford an oil that is much esteemed for certain purposes, and may be easily obtained by pressure. The following table indicates the quantities of oil which can be extracted from different fruits and other substances:

100 parts of each.	Oil, per cent.	100 parts of each.	Oil, per cent.
Walnuts - - - -	40 to 70	Hemp seed - - -	14 to 25
Castor-oil seeds - - -	62	Linseed - - - -	11 to 22
Hazel nuts - - -	62	Black mustard seed - -	15
Garden cress seed - - -	56 to 58	Beech mast - - -	15 to 17
Sweet almonds - - -	40 to 54	White mustard - - -	36 to 38
Bitter almonds - - -	28 to 46	Rape, colewort, and Swedish turnip seeds - - - -	33.5
Poppy seeds - - -	56 to 63	Plum kernels - - -	33.3
Oily-radish seed - - -	50	Colza seed - - -	36 to 40
Sesamum (*jugoline*) - -	50	Rape seed - - -	30 to 36
Lime-tree seeds - - -	48	Euphorbium (*spurge seed*) -	30
Cabbage seed - - -	30 to 39	Sunflower seeds - - -	15
Wild mustard seed - - -	30	Stramonium, or thorn-apple seeds -	15
Camelina seed - - -	28	Grape stones - - -	14 to 22
Weld seed - - -	29 to 36	Horse chestnuts - - -	12 to 8
Gourd seed - - -	25	St. Julian plum - - -	18
Lemon seed - - -	25		
Onocardium acanthe, or bear's foot	25		

To obtain the above proportion of oil, the fruits must be all of a good quality, deprived of their pods, coats, or *involucra*, and of all the parts destitute of oil, which also must be extracted in the best manner.

Colza, rape seed, and cameline oils, are employed for lamps; poppy, *madia sativa*, are employed (when recent) as articles of food, or for soaps

and painting; hemp seed and linseed for painting, soft soap, and for printer's ink; walnut oil for food, painting, and lamps; olive oil for food, soaps, and lamps.

In extracting oil from seeds, two processes are required—1st, *trituration;* 2d, *expression;* and the steps are as follows:

1. Bruising under revolving heavy edge millstones, in a circular bed, or trough of iron bedded in granite.
2. Heating of the bruised seeds; the heat either of a naked fire or steam.
3. First pressure or crushing of the seeds, either by wedges, screw, or hydraulic presses.
4. Second crushing of the seed cakes of the first pressure.
5. Heating the bruised cakes; and
6. Final crushing.

The seeds are now very generally crushed, first of all, between two iron cylinders revolving in opposite directions, and fed in from a hopper above them; after which, they yield more completely to the triturating action of the edge stones, which are usually hooped round with a massive iron ring. A pair of edge millstones of about 7 or 7½ feet in diameter, and 25 or 26 inches thick, weighing from 7 to 8 tons, can crush in 12 hours from 2½ to 3 tons of seeds. The edge millstones serve not merely to grind the seeds at first, but to triturate the cakes after they have been crushed in the press. Old dry seeds sometimes require to be sprinkled with a little water, to make the oil come more freely away; but this practice requires great care.

The apparatus for heating the bruised seeds consists usually of cast-iron or copper pans, with stirrers moved by machinery.

No. 34—(2.)

The following table of Veit is from E. Goodrich Smith's translation of Burger's Economy of Farming.

Kind of seed.	Oil, per bushel.	Oil cake, per bushel.	Quantity raised, per acre.	Quantity of straw, per acre.	Quantity of oil, per acre.	Quantity of oil cake, per acre.	Hay value of the oil cake, per acre.
	lbs.	lbs.	bushels.	cwt.	lbs.	lbs.	lbs.
Poppy - - -	14½	21½	18.5	12.6	254.4	402	669.6
Winter cabbage rape -	15.9	24	22	24	345.6	540	900
Winter turnip rape -	15.5	23.6	22	24	230.4	532.8	888
Summer cabbage rape -	13.4	24.4	18.5	19.2	242	458.4	663.2
Summer turnip rape -	12.5	24.7	18.5	16.8	234	462	769.2
Gold of pleasure rape -	11.2	26⅔	18.5	16.8	210	498	829.2
Sunflower seed - -	15	20	15	36	216	297.6	495.6
Oil radish - -	12.9	26	15	21.6	192	384.4	643.2
Mustard - - -	12.5	25.8	18.5	21.6	234	480	799.2
Spring flax - -	11.4	30½	7	12	864	228	319.2
Hemp - - -	6.5	23.3	10.5	18	72.2	260.4	433.2

No. 35—(1.)

STEAMING OF CATTLE, &c.

Cattle also are being steamed up at the West to advantage; and where pasturage is cheap, and cattle are plenty, it is doubtless a sure mode of disposing of stock to some profit. The importance of this subject deserves a more minute statement of the disposition of the whole carcass, upon which the gain depends.

The hide is salted with fine salt on the flesh side, and subsequently sprinkled with coarse salt, and rolled up for the English market; into which it is admitted at the low duty of about six cents per cwt. The hide shrinks about 18 per cent.; netts from 4 to 5 cents per pound. And here I would remark, that this foreign market is much better than the domestic market at the West. The hoofs are soaked in warm water, (not boiled;) and then the flesh is taken out for oil, while the horn part is sent to Europe as a substitute for shell in making combs. From the thigh and shoulders there is taken from 75 to 100 pounds of lean meat, suitable for drying. If the British market, or the market at the East, is good, 100 pounds of beef of the very best cuts are also reserved for the barrel. The liver is rubbed over with saltpetre, and then dry salted for about two or three weeks, and hung up to dry. This makes a most excellent relish during the summer, if fried in butter. The great object is, however, to extract from the carcass all the oil or grease, both from the flesh and bones. For this purpose, the carcass is cut into pieces and thrown into an iron cylinder capable of holding from 10,000 to 15,000 pounds of beef. After the top is fastened down, steam is let in to the extent of 70 pounds to the square inch, which is equal to 306 degs. Fahr.

After boiling 12 to 14 hours, and the oil or grease has risen to the top, it may be drawn into barrels for the European market. If this pressure of steam is continued upon the bones for a few hours more, they become soft. The rich soup in the kettle affords a most excellent nourishment for swine, especially if shorts or meal is added. It is estimated that 40 beeves killed per day, and tried up in the manner stated, will feed 600 to 1,000 hogs. The pork, it is true, will not be equal to the corn-fed, but will try up to advantage for lard, leaving also a further supply of soup.

If we consider the low price of cattle in the West, (viz: \$8 to \$10 for a large steer,) the cheapness of pasture, and the quantity of fat which is acquired by one summer's feed, we cannot doubt that this plan will give a certain market, which is far better than none.

The time will soon come when more attention will be paid to the selection of cattle for their hides. Some hides are actually worth twice as much as others for their wear after being tanned. The hides of the Durham cattle, for instance, are more open and porous than the hides of the native cattle, and hence their suffering from cold; and far less so than of the Scottish cattle upon the mountains. Very little has hitherto been said upon this point. I have written for information, which may arrive too late for this report.

The question arises, how much tallow will a fat steer afford? The following statement I received from a large packer at Cincinnati: If the ox weighs 700 pounds, deduct 25 pounds for kidney tallow; for rough gut tallow, 50 pounds; allow 100 pounds for hide, and 100 pounds for the lean

meat for drying; this will leave 425 pounds to be tried up. If the hide only is taken out, leaving 600 pounds. This, it is supposed, will give (if the steer is fat) from 25 to 30 per cent. of tallow or grease, and will be increased 6 or 10 per cent. The estimate given me is this:

Hide, 100 lbs., at 4 cents - - - - - - -	$4 00
Beef for smoking, 100 lbs., at 3 cents - - - -	3 00
Tallow, 150 lbs., at 6 cents - - - - - -	9 00
	16 00

No account is made in this computation of oil from the feet, or the grease and soup from the offal.

I have directed some new experimets to be made with 6 bullocks, to determine more definitely and satisfactorily the facts, as communicated above. I hope to receive the results before this report is closed.

Several patents have been lately taken out to increase the facility of trying up cattle, sheep, and hogs.

While on this subject, it may not be amiss to add the experience of some excellent graziers as respects salting the cattle as a preventive to the murrain, as well as hastening the accumulation of fat. Whoever has noticed the salting of stock, must have been struck with the eagerness with which they rush for this luxury. The strong ones get a double portion, while many get none at all. The successful ones, however, in their strife, seize much more than is good for them, since an excess occasions excessive thirst. A remedy is found by saturating salt with water, and then adding clay or ashes to absorb the liquid; the residuum, after standing still a little while, becomes a hard mass, susceptible of form. This is then conveyed, say in the form of a pyramid, to a convenient place (which should always be a dry place) for the stock to assemble at, and there protected by some covering from the rains.

To this pyramid, give the cattle free access. Sheep will usually lick the salt cake two or three times a day. None of the stock will take more than they want, and all will get enough. The experiment has been attended with the most favorable results.

In addition to the advantage of giving all the cattle such a supply of salt, it has been found that large herds have been saved entirely from the murrain. I would therefore recommend a trial, which can be easily made. If successful, the plan will save much labor and some danger. The following proportion will usually answer:

1 part salt dissolved in 2 parts water; $3\frac{1}{2}$ parts dry clay; $3\frac{1}{2}$ parts of wood ashes.

The ashes and clay will help to keep the stomach and bowels in good order. This is the great preventive of the murrain, which is a highly excited inflammation of the intestines. The supposition that this disease arises from drinking in leeches, which subsequently find their way to the liver, is often believed, but is not tenable. The leech (if so it may be called) found on the liver appears, upon microscopic investigation—indeed, also, to the naked eye—to be a very different thing from the water leech; besides, if the leech proceeded from the stomach to the liver, such a breach would be made as to cause the speedy death of the animal; nor could the leech very pleasantly find its way through the gall ducts. Be all this as it may, the experiment of salting in the mode prescribed is confidently recommended.

No. 35—(2.)

BALTIMORE, *November* 5, 1844.

SIR: According to my promise to you when in Washington a few days ago, I have inquired of Mr. Dawson (the gentleman who had the experiment in rendering up the beef made) the result of that experiment; and he informs me that, in consequence of some mismanagement in mixing the grease with some other, they did not get the exact result; but he was satisfied that it would not answer. He says that, to render out such a mass, requires a great quantity of fuel; and that the tallow is of very inferior quality, in consequence of the quantity of blood and fibrous matter that became mixed up with it. In his opinion, from an experiment made at the same time, it is better to cut all the fat off, and render it up by itself. The steer that he tried produced about 50 lbs. of rough fat and 25 lbs. of suet; and they cut out of the rest of the steer about 50 lbs. more of fat—making in all 125 lbs., which, according to the general calculation, would produce 75 per cent. of first quality rendered tallow.

Henry H. Williams, Esq., who is interested in the operation in Texas, informs me that they procure from seven head of cattle (weighing when dressed 500 to 600 lbs.) about 1,100 lbs. of rendered tallow; but, as before mentioned, it is of inferior quality; and I have been informed that, in the English market, it sells at 35*s*. per 112 lbs., when best quality tallow is selling at 42*s*. They are now killing about forty head per day; they pay 1¼ cent per pound for the cattle, dead weight. They feed hogs on the residuary meat; but he says the bones do not become pulpy and fit for hogs, as mentioned by you. They take out the bones, and they are valuable for shipment to Europe; they are assorted, and, after taking out those that are suitable for knife handles and buttons, or other purposes of art, the remainder are used for manure. I shall be pleased if the foregoing should be of any use to you; and, if I can be of any further service, you can command me. At the same time, I regret that the present is not more full.

Most respectfully, yours,

THOMAS M. SMITH,
For SMITH & CURLETT.

H. L. ELLSWORTH, Esq., *Washington.*

P. S.—Mr. Williams's operations are carried on by steam; he says they have a series of large wooden tubs, into which they put the beef, and inject steam.

T. M. S.

No. 35—(3.)

GALVESTON, (TEXAS,) *October* 25, 1844.

SIR: Yours under date of the 5th instant has been received, and I avail myself of the first conveyance for the United States to reply to your inquiries.

1st. A beef or steer in Texas is worth $1 25 per 100 pounds.

2d. The amount of tallow yielded from each varies (according to the order, size, &c.) from 30 to 175 pounds.

3d. There is a good portion of the lean meat dried; for which, however, there has not yet been any market. The new mode of which you speak has not been fully tested here yet.

Our beef here is all killed from the wild grass. Such a thing as feeding them, either in winter or summer, is not known in the country.

The report you mention having sent by mail has not reached me. I shall be pleased to see it.

Your obedient servant,

THOMAS F. McKINNEY.

H. L. Ellsworth, Esq.

No. 35—(4.)

Sandusky, (Ohio,) *December* 18, 1844.

Sir: Your favor of the 7th instant came to hand last evening. We with pleasure furnish you with such information as is in our power to give you, respecting the sheep slaughtered by us the past year.

The number slaughtered by us was not large. A part of the sheep we purchased to slaughter we sold, upon ascertaining that (probably owing to a very wet spring, which had the effect to sour the grass) the yield of tallow was less than we expected, being somewhat short of the yield last season.

We slaughtered 5,100 sheep, which yielded an average of about nine pounds of tallow each. The whole carcass was boiled up, except the hams. The tallow would have sold for (say) six cents per pound here, but is for shipment to Eastern markets. The pelts were shipped on a contract, (some of them previous to their being entirely dry,) and we did not ascertain their weight. They were mostly from large wethers; and good judges estimated that they would yield three and a half pounds of wool each pelt. Mr. Charles Hollister slaughtered at Huron, in this county, about 3,800 sheep, averaging about seven and a half pounds of tallow each.

Messrs. N. M. Standart, S. C. Burton, and Barber, of Cleveland, Ohio, are slaughtering a large number of sheep, and would no doubt furnish you with information respecting the business.

We are not doing much in the Canada trade; had not heard that there was a new duty on wheat for that destination.

Respectfully,

HOLLISTER & BOALT.

H. L. Ellsworth, Esq.

No. 35—(5.)

Custom-House, Cleveland, (O.,) *January* 4, 1845.

Sir: I have the honor to acknowledge the receipt of your letter of the 28th ultimo; and, in reply, beg leave to state that the number of sheep already slaughtered, and to be slaughtered, and tried up for tallow, at this place this season, will probably amount to over 50,000.

To get an estimate of the value of sheep for this operation, I made inquiry of a friend who purchased 20,000, and has now slaughtered and tried up 15,000; and the following is the result, as nearly as can be ascertained:

Estimated cost of sheep, each - - - - - -		\$1 12½
Expense of slaughtering and rendering - - - -		10
		1 22½
Average amount of tallow, 8 pounds, at 5½ cents -	\$0 44	
Average amount of wool, 3 pounds, at 33 cents -	99	
For hams - - - - - - -	5	
Gain, each - - - - - -		25½

The above is an estimate for a lot of fair quality.

Our wheat can be carried to Canada, and be there ground and manufactured into flour, and taken to England under Canadian duty. One house here shipped, during last summer and fall, 36,000 bushels of wheat, which was ground at St. Catharine's, on the Welland canal, and shipped to London under contract.

There has been no law passed in Canada in relation to duties on our produce, since last year. The duty on wheat and flour is as follows:

On wheat, 8¾ cents per bushel of 60 pounds.

On flour, 49 cents and a fraction per barrel.

Very respectfully, your obedient servant,

WILLIAM MILFORD, *Collector.*

Hon. H. L. Ellsworth,
Commissioner of Patents.

No. 36—(1.)

From the British Cultivator.

THE ALPACA,

Its naturalization in the British isles considered as a national benefit, and as an object of immediate utility to the farmer and manufacturer: by William Walton.

For most of our cultivated plants, and indeed for many of our domestic animals also, we are indebted to other countries. With regard to the former, the history of their introduction is, in many cases, well established in detail; but it is so long since the latest of them—the potato, the turnip, or the mangel wurtzel, or carrot, for instance—was first cultivated in our country, that farmers have fairly settled down into the belief that they must make the best of the subjects they have on hand, for that Nature has nothing further in her stores, suited, in our climate, for the wants of man or beast. And with regard to the latter, the introduction of the very latest dates so much further back, that we must estimate the prejudice as stronger still, which scouts at the idea of any further addition being made to our

stock of domestic animals from the lists of other countries. Of course, in speaking of this universal prejudice, we allude simply to the generality of those who at present occupy and cultivate our soil, and who form their opinion, probably, without very well knowing the grounds upon which it rests.

There is every probability, notwithstanding the general notion to the contrary, that a useful addition will shortly be made to our stock of domestic animals. The alpaca, from the experience of it which has been compiled from various quarters in this country by Mr. Walton, really seems likely hereafter to play an important part in the stock-farming of the hilly districts of the kingdom. This animal is indigenous in the mountainous regions of Peru, where two domesticated species of it occur. The one, receiving the name of llama, is used as a beast of burden; the other, the alpaca, to which we at present allude, is a wool-bearing animal, and of it large flocks were formerly possessed by the Incas, sovereigns in former days of that country, and by other wealthy inhabitants of it. The climate of the districts in which this animal flourishes is described by Mr. Walton as follows:

"The woolly natives possess a hardiness of constitution, and a peculiarity of structure, admirably well adapted to the nature of their birthplace. There, during half the year, snow and hail fall incessantly; whilst in the higher regions, as before noticed, nearly every night the thermometer falls below the freezing point, and the peaks, consequently, are constantly covered with an accumulation of ice. The wet season succeeds," &c.

On the applicability of the alpaca to our soil and circumstances, we quote the following remarks:

"The hardy nature and contented disposition of the alpaca cause it to adapt itself to almost any soil or situation, provided the heat is not oppressive, and the air is pure. The best proof of its hardiness is its power to endure cold, damp, hunger, and thirst—vicissitudes to which it is constantly exposed on its native mountains; while its gentle and docile qualities are evinced in its general habits of affection towards its keeper. No animal in the creation is less affected by the changes of climate and food, nor is there any one to be found more easily domiciliated than this. It fares well while feeding below the snowy mantle which envelopes the summits and for several months in the year clothes the sides of the Andes. It ascends the rugged and rarely-trodden mountain path with perfect safety; sometimes climbing the slippery crag in search of food, and at others instinctively seeking it on the heath, or in rocky dells shattered by the wintry storm; at the same time that, when descending, it habituates itself to the wet and dreary ranges on the lowlands, so long as it is not exposed to the intense rays of the sun.

"Many of our northern hills would try the constitution of any sheep, and yet there the weather is never so inclement or so variable as on the Cordilleras of Peru. With so many advantages, why, then, shall not the alpaca have an opportunity of competing with the black-faced sheep, the only breed that can exist in those wild and inhospitable lands. Of the two, the stranger would fare best on scanty and scattered food; at the same time affording to the owner a far better remuneration."

The alpaca wool is at present used largely in British manufactures. Mr. Walton estimates the quantity hitherto consumed, since its introduction in 1832, at 12,000,000 lbs. The price of it varies from 1*s.* 8*d.* to 2*s.* 6*d.* per

pound, and the average weight of the fleece may be put at 10 pounds. Were the animal fairly naturalized on some of our bleakest hill districts, such land would soon increase in value from the increased worth of its annual produce in alpaca wool. And it appears, from the experience of several gentlemen who have small flocks, that, when its habits shall be thoroughly understood, little difficulty will be experienced in doing so. The following is a statement by Mr. Stirling, of Craigbarnet place, Lenoxtown, Glasgow, a gentleman better qualified to speak on the subject than any one we could name:

"I can have no doubt that, when the subject is better understood, the animal itself better known, and a more expeditious method contrived to bring them to Britain, we shall have thousands of them. When known, their docility, their temperate habits, their hardiness, and, I may add, their easy keep, will, ere long, bring them into general notice. I can answer, without the fear of being contradicted, that they will thrive and breed in Scotland equal, if not superior, to our native black faced sheep."

To those who would laugh at the idea of bringing over here, and domesticating on our hills, a Peruvian camel or sheep, (for the alpaca has properties in common with both,) we would point to Australia, a country which not many years ago possessed no quadruped but the kangaroo; and yet, notwithstanding its many peculiarities of climate, is now thickly peopled with our sheep and oxen. But the question must not be left to generalities of this kind. The experience of a few short years, on the larger scale which expected importations will enable, will determine it satisfactorily; and if, as in all probability will be the case, the alpaca should become one of our domestic animals, the best thanks of the country will be due to Mr. Walton, for the persevering energy with which he has pressed the subject on public attention. His book is an exceedingly interesting and neatly got up little volume, and will, we doubt not, prove a useful publication.

No. 36—(2.)

From the American Farmer.

THE ALPACA, OR SHEEP OF THE ANDES.

There is a great effort now being made in England, Ireland, and Scotland, to introduce into these countries the fine-wooled sheep of a portion of South America, called *alpacas*, or the *sheep of the Andes*. As far as experiments have gone, it appears not only practicable to naturalize or acclimate them to the climates of these respective countries, but the gratifying facts have been demonstrated, that they arrive earlier, by two years, at that state when the powers of procreation are developed; that the *wool* is *finer* and *softer* than that imported from their native country, having much more *yolk* imparted to it by the superior pasturage found in Great Britain, to that found on their natal mountains, and that the *fleece* is also increased in weight from 50 to 70 per cent., as well as in length of staple. These facts embrace considerations of great moment in an agricultural point of view, as they tend very much to enhance the value of their wool, both to the manufacturer and farmer.

The *alpacas* are represented as hardy, docile animals, affected neither by wet nor cold; existing best on the coarse herbage of mountain pastures—

on such herbage as scarcely any other animals could subsist upon. So far as the experiments in Great Britain go to establish facts connected with their habits, it would seem that the greatest difficulty to be apprehended in that country arises from the too great luxuriance of the pastures in the cultivated portions of these countries, producing surfeits in the blood, which produce cutaneous affections resembling the itch in the human family. But as this is a physical difficulty, which may be overcome by depasturing them in the mountain regions, it is not of serious moment, because it may be avoided. The supposed average weight of clip in the range of Peruvian mountains, the Andes, is 10 pounds; whereas in England they have risen to 17 pounds. This fact shows that translation from South America to Great Britain has exerted a fortunate influence upon that part of their production which imparts to them their greatest value; for although their *carcass*, when they are killed young, is available for edible purposes, weighing 180 pounds, still their *wool* must be looked upon as the most lucrative part of them; that being *fine* and *silky*, most happily adapted to all the nicer qualities of woollen fabrics, and commanding high prices and ready sales.

The alpacas live for twelve years without experiencing any material deterioration in their yield of fleece, and in this respect may be said to possess an advantage over common sheep, or, indeed, over either the merinos or Saxony merinos; their wool being finer, longer, more silky, and preferred in the manufacture of most of the goods of the more delicate texture; and the fact that the fleece of one alpaca is equal in weight to upwards of five or six merinos or Saxons, is a consideration of preponderating force.

A very intelligent British author, whose work we have just read, in speaking of the *scab*, (the disease to which they are disposed to be subject,) seems to think that, in their native land, it is ascribable to sudden atmospheric changes operating upon the perspiratory organs with deleterious effect; but suggests that, by timely and judicious treatment in its incipient state, the disease may be promptly arrested—bathing, and cooling aperients, being the only treatment necessary to restore a healthful action upon the skin, and relieve the animal. The appearance of the disease among the animals which have been imported into England, Ireland, and Scotland, he ascribes to a combination of causes, all of which are within control, and which we will here attempt to briefly notice; though, before we do so, we must be candid, and say that although we admit there is great force in his remarks, in our opinion the importations into Great Britain have not been sufficiently numerous, as yet, to establish, by the premises thereby furnished, such a series of well-defined deductions as would amount to any thing like unerring rules.

The alpacas, in their home pastures, are permitted to traverse their native mountains, where, 4,000 feet above the level of the sea, they have an almost illimitable range, breathe a pure air, and have appointed places for bathing—a luxury which they delight in, and which tends to eradicate dirt from their skins, and to keep the pores open. When brought to the coast for shipment, they are pent up in close enclosures, or sheds, and subject to the discomfort of fetid air. Their food, too, is changed from the stinted and coarse herbage of the mountains to clover and grain. On board ship they are confined in small coops, exposed to the foul air of bilge water, and the equally offensive exhalations of guano, and are again fed also upon clover and grain—a diet by no means adapted to animals which have been always previously used to a most stinted and abstemious diet, and

particularly so, as, from their deprivation of exercise, their systems are no prepared for so sudden a change as from thin potations to luxurious fare. Again: upon their arrival in Great Britain, through a mistaken kindness, instead of being at once sent to highland and mountain pastures, they are put upon the forcing system, to gormandize themselves into a surfeit; and thus, through *riotous* living, (if we may use the term,) to engender disease.

The cost of the alpaca, including the purchase and transportation to the shipping port from the mountains, is trifling—not exceeding $5 a head; and we should presume that the freight to America would not exceed from $15 to $20 a head; so that the cost here, *per capita*, could not, in any event, exceed $25. But, as it would be advisable to have them accompanied by a native shepherd, the cost of his passage and wages should be taken into the bill of expenses; and hence, if importations were made into this country, it would be well for several gentlemen farmers to join, in order that the shepherd's expenses might be divided among them.

We have brought this subject to the notice of our readers, because we are most sensibly impressed with the belief that there is an obvious necessity for a change in the system of husbandry of this country; that other products than those now raised will have to be grown, to maintain such prices as will prove remunerative of the labor bestowed and capital invested.

We have long foreseen that there was abroad a spirit of concentration upon particular crops, and an expansion of the quantity grown, that would operate to decrease their moneyed value. Among these, we will, for the present, enumerate three great staples of the planting and farming interests. The cotton, tobacco, and wheat culture, within the last few years, have been so extended, as that it may now be said to have reached a point of production beyond the demand, and to indicate, with unerring certainty, that a portion of the force now engaged in growing these productions must be diverted to other and new pursuits. We have arrived at this conclusion after long, impartial, and serious reflection; and we should consider ourself faithless to the trust reposed in us, as the editor of this journal, did we not, in all frankness, so express ourself. We speak now of the cotton, tobacco, and wheat, grown within the limits of our own happy Union; but when we reflect upon the experiments already made in Texas in the culture of these products, and consider the adaptation of her soil and climate to such purposes, we are the more strongly impressed with the necessity which exists for diversifying our own agricultural labors.

Impressed as we have been with these sentiments for a considerable time, it is now two years since that we suggested the introduction into our agricultural pursuits of the culture of madder; and many months since we endeavored to claim the attention of our readers in behalf of an extension of sheep culture. And now we have deemed it our duty to present to their consideration the propriety of importing alpacas, with the view of their engaging in the most profitable branch of wool growing.

The English farmers and noblemen have already tested the important truths, that the alpaca does not deteriorate by being translated to the highlands of England, Scotland, and Ireland; but, on the contrary, that the animal undergoes a most striking improvement in his capacities for earlier breeding, as well as in the quality and quantity of his fleece; and with these facts, thus satisfactorily established to our hands, we do think it should be a sufficient inducement with farmers and planters to go at once into the experiment of testing the question whether our country is not equally

well adapted to the introduction of the alpacas as either England, Ireland, or Scotland.

In our vast territory, there are millions of acres of mountain lands which are now not producing a dollar a year to their proprietors, that might be converted into alpaca pastures, and thus be rendered sources of great profit. In Virginia, North and South Carolina, and Georgia, there are mountains and highlands enough, if converted into walks for the sheep of the Andes, as would, in a very few years, add a million to the annual income of those States. Then, we ask, why should the intelligent planters and farmers of those States hesitate to engage in an enterprise that could not fail to be productive of the most striking pecuniary advantages to themselves and their common country?

Alpaca wool.—More than two million pounds of wool of this beautiful animal were imported into Great Britain, in the year 1843, from western South America. This fact alone shows the great importance of the animal, and the propriety of efforts to acclimate it in this country. Enlightened and patriotic individuals in England have expended considerable sums for this purpose, with the brightest prospects of success.

In Nos. 8 and 9 of the Farmer and Mechanic is a reprint of an English work, containing a full history of the attempts to introduce the alpaca into Great Britain. The work has two engravings, and is afforded for 20 cents, although the English copy cost $1 37½.

No. 37.

POULTRY.

Poultry may justly be classed among the most profitable as well as convenient appendages of the farmer's stock. This affords daily nourishment, and furnishes the means of manufacturing the luxuries of life. If we were for a time deprived of poultry, our loss would be severely felt; the products of this branch of supplies are so intimately interwoven with the various dishes for the table. No capital is more profitable than that which is invested in the business of raising poultry. It would not be an over-estimate, we believe, to place the value of the poultry in the United States at $12,000,000. Its importance deserves more attention. The public are greatly indebted to Mr. Bement, for his excellent publication on this subject, styled the "American Poulterer's Companion." We have made, from this work, a few short extracts, designed to teach some important things in respect to the bearing of the subject on the agricultural and other interests of our country:

"But though most farmers keep fowls, and raise their own eggs, there are many who have not learned the difference there is in the richness and flavor of eggs produced by fat and well-fed hens, and those from birds that have been half-starved through our winters. There will be some difference in size, but far more in the quality. The yelk of the one would be large, fine colored, and of good consistence, and the albumen, or white, clear and pure; while the contents of the other will be watery and meager, as though there were not vitality or substance enough in the parent fowl to properly carry out and complete the work that nature had sketched. In

order, therefore, to have good eggs, the fowls should be well fed, and also provided, during the months they are unable to come to the ground, with a box containing an abundance of fine gravel, that they may be able to grind and prepare their food for digestion. Of eggs, those from the domestic hen are decidedly the best; but those of ducks and geese may be used for some of the purposes of domestic cookery."—Page 10.

"In well-fed fowls, the difference will be seen, not only in the size and flesh of the fowls, but in the weight and goodness of the eggs; two of which go further in domestic uses than three from hens poorly fed or half starved."—Page 31.

"To promote fecundity and great laying in the hens, it is necessary that they be well fed on grain, boiled potatoes, (given to them *warm*,) and, occasionally, animal food. In the summer, they get their supply of animal food in the form of worms and insects when suffered to run at large, unless their number is so great as to consume beyond their supply in their roving distance."—Page 33.

The following communication from Mr. Bement, taken from the American Agriculturist, will likewise be read with interest, as it shows the degree of profit, ascertained by actual experiment, derived from about 100 fowls:

"I noticed, in the last number of the American Agriculturist, some queries propounded by a correspondent over the signiture of 'H. C. M.' in regard to the profits from, number of eggs obtained, and amount of food consumed by a given number of fowls per year.

"Now, sir, in the first place, I would recommend to your correspondent to try the experiment himself, even if it be on a small scale—say from twelve to twenty fowls. Keep an accurate account with them; charge the cost of the fowls, the food they consume, and all expenses attending them. Keep an accurate account of all the eggs obtained, and all the chickens raised; and, at the end of the year, credit the eggs and the stock on hand, and the queries will be answered. But, as he probably wishes to avail himself of the experience of others, and jump into the business at once, I will endeavor to gratify him by giving the result of some of my experience.

"When I first moved on to my farm, I kept about one hundred fowls, which were allowed to run and roost where they pleased, annoying me in the garden, destroying my grain, and soiling my implements, and from which we did not obtain over one thousand eggs and about sixty chickens during the year. I then built me a poultry house, and enclosed about one-fourth of an acre of ground with a picket fence between six and seven feet high, placed the fowls in it, and commenced keeping debit and credit with them. In six months and seven days we obtained from sixty hens two thousand six hundred and fifty-five eggs. The year following, from the same number of hens, we obtained over four thousand eggs.

"Hens that are well fed and attended to will average about ninety eggs each per year; and they will consume about thirty-eight quarts of grain, in proportion as follows, per head, in the same time:

"The amount consumed within the year, of the different kinds of grain, was—

91	bushels of wheat screenings, at	21 cents	- - -	$19 11
6	" rye	62½ "	- - -	3 75
11	" millet	62½ "	- - -	6 87½
2	" corn	56¼ "	- - -	1 12½

3 bushels of barley, at	50 cents	- - - -	$1 50
2 " Indian meal, at	100 "	- - - -	2 00
115 "		- - - - - - - - -	34 36
Amount of eggs and poultry sold was		- - - -	56 79
Leaving a balance of only		- - - - -	22 43

"We were more fortunate last year, as will be seen from the following. Our stock consisted of 84 fowls, including cocks, 3 turkeys, 7 geese, 2 ducks, and 2 guinea fowls; which was, of course, much increased in the spring and summer by the young reared. They consumed—

71 bushels of wheat screenings, at	15 cents	- - -		$10 65
4 " millet,	50 "	- - -		2 00
14½ " corn,	42½ "	- - -		6 17
30¼ " oats,	24 "	- - -		7 26
8 " potatoes, boiled,	25 "	- - -		2 00
127¾ "		- - - - - - - - -		28 08
We obtained 4,152 eggs, average 1 cent		- - -	$41 52	
80 fowls sold for		- - - -	47 15	
32 bushels manure sold, at 18¾ cents, for		-	6 00	
				94 67
Profit		- - - - -		66 59

"These fowls were confined in a yard, and allowed as much grain as they would eat, it being kept constantly before them, changed often; and in the winter boiled potatoes were fed to them warm, and occasionally animal food. They were plentifully supplied with lime, gravel, and water. Some allowance, however, must be made in regard to the amount of sales, as many of the fowls were of fancy breeds."

He adds, in his volume:

"By referring to the agricultural statistics of the United States, as furnished by the last census, taken in 1839 and published in 1840, it would appear the value of poultry in the State of New York amounted to $2,373,029; and that of the various States and Territories of the Union amounted to the sum of $12,176,170."

"The annual consumption of poultry and small game in the city of Paris usually amounts to £22,000,000. The quantity of eggs used annually in France exceeds 7,250,000,000; of which enormous number Paris uses about 120,000,000. The importation of eggs from Ireland, in 1837, to Liverpool and Bristol alone, amounted in value to £250,000. The importation from France the same year was probably greater."

It appears, from the custom-house returns of the year 1838, that eggs were imported into England (though oaded with heavy duties) from the continent, to the value of more than a million of dollars.

Eighteen tons of poultry, it is said, left Syracuse, New York, in one day, for the Boston market. It is supposed that there may be consumed in the United States 1,400,000,000 of eggs; and, averaging the value at 6 cents per dozen, this would amount to $8,000,000. If we allow an average of 5

chickens, or other kinds of fowls, a year to each person, at a cost of 12½ cents average, including turkeys, geese, ducks, &c., this will amount to more than 97,500,000—equal in value to more than $12,000,000 annually; making the aggregate value of the consumption of poultry, to say nothing of the amount which might be added for the feathers. It is said to have been ascertained, that half a million of eggs are consumed every month in the city of New York. One woman in Fulton market sold 175,000 eggs in 10 weeks, supplying the Astor House each day with 1,000 for 5 days, and on Saturday 2,500.

No. 38.

STATISTICS ON WHEAT IN OHIO.

The following extract from the report of the committee appointed by the Agricultural Society of Hamilton county, Ohio, will be read with deep interest. A similar examination in other sections of the United States is strongly recommended.

There is no doubt of a direct connexion between the constitution of a soil and the timber it produces; and from this we may deduce a connexion between timber and crops. The heaviest crop of wheat is found on land having sugar tree and oak as the principal timber, as will appear from the following classification:

Sugar and oak - -	10	cases,	average crop	18.40	bushels.
Sugar and beech - -	19	do	do	17.52	do.
Beech and oak - -	7	do	do	17.14	do.
Sugar, oak, and hickory -	5	do	do	16.66	do.
Oak - - - -	21	do	do	16.00	do.
Hickory - - -	10	do	do	14.50	do.
Beech - - -	12	do	do	14.33	do.
Miscellaneous - -	30	do	do	15.50	do.
General average of - -	127	do		16.50	do.

The mixture of sugar and oak appears to give the best yield; sugar and beech, next; and beech and oak, the next. If an analysis of these soils, and of the wood most congenial to them, were carefully made, we should probably discover not only a resemblance between them and their timber, but between the timber produced and the grain and straw of wheat.

The statement of an average yield of wheat enables us to ascertain the number of acres cultivated in wheat in 1839, when the official return gives 213,815 bushels for the product of that year. If that year gave an average crop, the quantity of ground then in cultivation in wheat was 13,029 acres.

The crop, since 1840, has been more uncertain in its yield, price lower, and demand less; from which we conclude that there has not been an increase in the production of the country since that time.

Misfortunes to which the crop is liable.—The record we have given of the remarks made upon wheat shows that there are three principal evils to which it is subject, viz: rust, fly, and freezing out. The average loss of the crop, by these and other causes, is once in four years a total failure.

Evils and seed.—The farmers differ in regard to which of these is the greatest enemy to wheat; six of those speaking upon the subject regard rust as the difficulty most to be avoided; nine consider freezing out the most injurious; and nine suppose the fly to be the worst enemy.

Respecting the quantity of seed, the farmers of Hamilton vary from three to five pecks. Mr. Smethhart considers three pecks to be better calculated to insure a full crop than more. In Flanders, two Winchester bushels are sown to the English acre, which is nearly eight pecks of our measure; in England, two and a half to three and a half bushels.

The richness and depth of the soil has so much to do with the quantity of seed, that it is difficult to establish a rule upon the subject. In England, however, where the dibbling process has been tried, and the seed planted in regular squares of six inches on a side, and a seed in the middle of two sides, the quantity is reduced to about one and a half bushels to the acre, and the yield increased many fold.

Time of sowing—prices.—Among the farmers who gave answers to our inquiries about the time of sowing, four put in their wheat in August, four in October, nine in September, and one in November. Of those who prefer September, six sow during the first ten days, one by the first day, and two in the latter part of the month.

Those who cover the seed in the first week expect to harvest between the 25th and 30th of June.

The following table exhibits the price of wheat at Cincinnati, every six months, for four years past:

1840, July 1	$0 56	per bushel.
1841, January 1	58	"
" July 1	73	"
1842, January 1	1 06	"
" July 1	55	"
1843, January 1	50	"
" July 1	85	"
1844, January 1	75	"
" July 1	60	"

Average price per bushel, 67½ cents.
Average in January of each year, 72.22 cents.
Average in July of each year, 65.80 cents.

The method of tilling is very various. In new ground, for the first crop, the seed is generally scattered over the fresh surface, and harrowed in without ploughing. The rooty condition of the ground frequently prevents the use of the plough.

In old ground, the practice most in vogue among farmers is to summer fallow, and harrow in upon the sod. In fields that are clear of stumps and stones, (and very few farms in Hamilton county are troubled with stone,) the plough lies over the sward very uniform and flat. It is thought that ground made too mellow and fine is more liable to winter-kill the wheat than such as is in the state of clods, provided they are dead and rotting.

Some cases will be observed in our abstract, where clover has been turned in, and wheat sown upon furrow immediately, and also where turf land has been broken up a few weeks before seeding.

In land where ploughing can be done so perfectly as to turn over all the soil, and is not inclined to send up grass and weeds, this practice of sowing

soon after breaking up is undoubtedly advantageous. It allows the growing plant a chance to absorb more of the volatile portions of the decomposing sward.

Upon the whole, this region cannot be said to be well adapted to the culture of wheat.

Uncertainty of crops.—A crop which is liable to be cut off once in four years is too uncertain to be raised with profit for sale, although every good farmer would continue, even under this disadvantage, to sow enough for his family use. It is much less sure, and also less abundant in yield, than formerly, when the country was new.

This seems to indicate a change of climate, as well as a change in the condition of the soil. The effect of cleared land, and of cultivation, is to cause a greater number of thawings and freezings, which are each of them injurious to the root; and when land becomes heavy by constant use, the effect of frost in that way is different and more destructive.

The country is filled with the fly, and there seems to be an increased disposition to rust. Very early sown wheat generally escapes the rust; but appears to be more exposed to the fly.

The Alabama wheat has hitherto escaped both, and produces a fine yield of good wheat. It has, however, not been tried long enough to pronounce upon its ultimate success. We should expect a grain from the South to mature earlier, and consequently do better, provided the winters did not injure it.

Varieties and composition.—A kind of wheat, called Virginia wheat, has been tried with that view, as we are told, and gave a good crop; but we have no personal knowledge concerning it.

Mr. Frost, of Crosby, has tried Saxon wheat, and considers both it and the "blue stem" as before our common kinds, and even before Alabama.

The fact noted by Mr. Brown, that the fly which infested the timothy part of his fallow did not the clover, is worthy of remembrance.

In England there are 42 varieties of cultivated wheat—winter, spring, and summer; but, as yet, they are not well classified in botanical order.

The Romans of the days of our Saviour sowed the common red and the white wheat in general, but in moist situations they made use of the bearded.

Sir Humphrey Davy's analysis of wheat shows that the spring wheat contains the largest amount of gluten; and the Farmers' Encyclopedia intimates that it is the most nutritious.

Kind of wheat.	Gluten.	Starch.	Insoluble matter.	Total.
English wheat - - - -	19	77	4	100
Sicilian " - - - -	20	75	5	100
Spring " - - - -	24	70	6	100
Blighted " - - - -	13	52	35	100

The substances of a mineral kind drawn from the earth, are, according to the analysis of *Sprengel*, for 1,000 pounds of

Wheat and straw, per acre.	Wheat.	Wheat straw and wheat.	
285 pounds.	225 pounds.	20 pounds.	Potash.
337 do	210 do	29 do	Soda.
816 do	96 do	240 do	Lime.
186 do	90 do	32 do	Magnesia.
296 do	26 do	90 do	Alumina and iron.
9,010 do	400 do	2,870 do	Silica.
161 do	50 do	37 do	Sulphuric acid.
550 do	40 do	170 do	Phosphoric acid.
100 do	10 do	30 do	Chlorine.
117.41 pounds.	11.77 pounds.	38.18 pounds.	Weight of ashes.

If we call the weight of straw per acre 3,000 pounds, (which is near the average,) and allow 16 bushels of grain, (or say 1,000 pounds weight,) we shall have 4,000 pounds as the vegetable product, which leaves 117.41 pounds earthy residue.

This result is not strictly exact; and the grain of Germany, where Sprengel operated, may not be composed exactly as our own. The most striking fact contained in this table is the discrepancy between the amount of lime in the kernel, compared with the stalk.

Time of harvesting.—Having given the principal details of our observations among the cultivators of the soil at home, we add some considerations from the experience of farmers in other countries, particularly in relation to the state of wheat when it is cut.

In 1840, Mr. John Hannam, of North Deighton, in Yorkshire, England,* made several experiments upon the relative values of wheat cut at various stages of ripeness. It should be borne in mind that the harvests of England occur from four to six weeks later than in southern Ohio.

Specimen No. 1, cut green, August 4.

Specimen No. 2, cut raw, August 18.

Specimen No. 3, cut ripe, September 1.

The green specimen had not begun to turn yellow; the chaff adhered to the kernel, which was green, soft, and full of milk, although perfectly formed. No. 2, or the raw, was quite yellow from the roots about one foot upwards; and the whole stalk, though apparently green, was seen to be, on close examination, of a yellowish tint. The ears were open, the chaff yellow and green, and the grain still soft and pulpy, with some fluid matter in the kernel. The specimen No. 3 was ripe, without being dead ripe or brittle, but in what is called harvesting order.

The ripe gave 30 bushels of 60 pounds, and 2,688 pounds of straw.

The raw gave 30.1307 bushels of 60 pounds, and 2,352 pounds of straw.

* Farmers' Encyclopedia, article *Wheat*, page 1124.

The green gave 26.1356 bushels of 60 pounds, and 2,737 pounds of straw.

The straw of the green parcel was, as we see, about 385 pounds heavier than the raw, and 49 pounds heavier than the ripe. The price per quarter of 8 bushels, showing the quality in market, was—

For the ripe - - - - - -	62 shillings.
For the raw - - - - - -	64 do
For the green - - - - - -	61 do

The produce in money per acre, including straw, stood as follows:

	£	s.	d.
Ripe - - - - - - - -	12	17	3½
Raw - - - - - - - -	13	7	3½
Green - - - - - - -	11	11	10¼

The same gentleman made further experiments in 1842, and derived the following results. He cut grain fully ripe, two days before ripe, two weeks, three weeks, and four weeks; which specimens are numbered 1, 2, 3, 4, and 5, beginning with the greenest:

100	pounds	No. 1,	gave flour	75	pounds,	shorts	7	pounds,	bran	17	pounds.
100	do	No. 2,	do	76	do	do	7	do	do	16	do
100	do	No. 3,	do	80	do	do	5	do	do	13	do
100	do	No. 4,	do	77	do	do	7	do	do	14	do
100	do	No. 5,	do	72	do	do	11	do	do	15	do

Here No. 3, which is called raw, and was cut two weeks before ripeness, gives 8 per cent. more flour than No. 5, cut ripe. The ripe gave least of all; and No. 4, cut two days before ripeness, the next largest quantity.

Of course, the bran and shorts of No. 3 were least, and the bran was found to be thin and soft; while No. 5 was coarse and harsh. The average yield per acre, of these experiments, was 28 bushels; and the weight of flour in equal measures of wheat was 15 per cent. in favor of the raw over the ripe; the gain in straw, 14 per cent. There was a gain in value, of 163 pounds of wheat per quarter; and in the acre, yielding 28 bushels, a gain of 583 pounds.

No. 39.

For the Southwestern Farmer.

MANUFACTURE OF COTTON BAGGING, &c.

Natchez, *January* 13, 1845.

Dear Sir: I noticed in your paper, the other day, an estimate, made by Dr. Phillips, of the amount of cotton which might be consumed by the slaveholding States (ten) in mattresses, comforts, blankets, &c. To this estimate, I think it might do some good to add the probable quantity that could be consumed in cotton cotton-bagging, rope, twine, and negro clothing. For instance:

To cover 5,000,000 bales cotton, it would require an average of 5 yards per bale, of 45 inches wide, and weighing 1¾ lb. to the yard; the quantity of raw material would be 2 lbs. per yard, or 20,000,000 lbs. - - - - - - 20,000,000

To tie the same, 4 lbs. cotton rope per bale, or 5 lbs. raw material - - - - - - -	10,000,000
To sew the same, ½ lb. cotton twine per bale, say - -	600,000
To clothe 2,147,000 negroes, 2 suits, average 5 yards, 4-4 domestic, to weigh ¾ lb., equal to 1 lb. raw material per yard -	10,735,000
Pounds of cotton thus used - - - -	41,335,000
400 lbs. to a bale—thus using bales - - - -	103,338
Add to this the estimate by Dr. Phillips, for mattresses, comforts, &c. - - - - - - -	146,515
Total bales - - - - - -	249,853

To consume such a quantity of the raw material at home would most certainly have a favorable bearing on prices of this article in domestic and foreign markets. And this is not all that might be consumed at home, by a great deal, if the white male inhabitants of the Southern States would agree, as their sires did in old times, to wear the old-fashioned cottonade for pantaloons and jackets, and cotton knit socks.

* * * * * * * * *

I hope you will excuse this scrawl, as I write it from my sick chamber.

Yours, truly,

SAML. T. McALISTER.

N. G. North, Esq.

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*Comparative cost of fabrics produced at "*our*" factory at Natchez, and those bought at the North and West.*

In our last paper, we noticed various articles fabricated at Mr. McAlister's factory, Natchez, together with the dimensions, prices, &c. It is now our purpose to compare them with similar articles produced abroad; and even the blind must see that it is cheaper to support our own establishment. But to the figures:

	Per 100 *yards.*
Kentucky bagging costs 12½ cents per yard - - -	$12 50
" linsey, 35 cents per yard - - - -	35 00
Lowells, 12½ cents per yard - - - - -	12 50
Sacking, 18 inches wide, 13 cents per yard - - -	13 00
Add difference between 18 and 45 inches wide - - -	19 50
Cost of Kentucky and Northern fabrics - - - -	92 50
Cost of Natchez fabrics - - - - - -	65 50
Saved to the planter - - - - - -	27 00

in a purchase of less than $100 worth in a matter of 400 yards of goods. In other words, a saving of 30 per cent. Any one can cipher it out for himself, as follows:

Cost of Natchez fabrics.

	Per 100 yards.
Cotton cotton-bagging, 1¼ lb. to the yard, at 12½ cents per yard -	$12 50
" 200 lbs. cotton, at 3 cents - -	6 00
Linsey, 7-8, 4-4, at 12½ cents per yard - - - -	12 50
" 75 lbs. cotton, $2 25; wool, $6 25 - - -	8 50
Lowell, 3-4, 4-4, at 6 cents per yard - - - -	6 00
" 100 lbs. cotton, at 3 cents - - - -	3 00
Sacking, 45 inches wide, double and twist thread, 12 cts. per yard	12 50
" 150 lbs. cotton, at 3 cents - - - -	4 50
Cost of Natchez fabrics - - - - -	65 50

Equal to 30 per cent. saved. *Quod erat demonstrandum.*

The foregoing estimate, it will be seen, is made very large as to the cost of manufacturing at the Natchez establishment; for we have put down the cost of cotton at 3 cents per lb., whereas most of the fabrics, or at least many of them, can be made of trash or refuse cotton. The sacking made for Mr. Isaac Dunbar, for instance, of which we made mention last week, and of which a sample can be seen at Mr. Gibbs's store, was manufactured, as stated, out of "unmerchantable cotton." The cost of manufacturing bagging, too, is 10 cents at the Natchez factory; but we have put it down at 12½ cents, so as to be doubly sure of demonstrating to our friends that, by going to Natchez instead of Kentucky, Lowell, &c., they will save 30 cents on every dollar expended.

Now, friends, we are not musically inclined just now; for we are more disposed to cipher than to sing. Still, however, we cannot forego the opportunity thus afforded, to ask all those who wish to sing, to strike up at once to the tune of "*Home, Sweet Home.*"

No. 40.

PROVISIONS FOR EXPORTATION.

CAPITOL HILL, WASHINGTON CITY, *January*, 1845.

SIR: The merchants of Liverpool, I observe, complain that the beef and pork sent from this country to that port is hard, coarse grained, and of a dark color. Now, is not the dark color occasioned, in some degree, by the blood not being well drawn from the animal when slaughtered?—a practice too frequently used by butchers, with the view, as they term it, to make the animal "weigh well;" but does it not prevent the beef from keeping, and spoil its flavor? And another cause of our meat being inferior to the English is the horrid practice of neglecting to alter the animal when he is only a few weeks old, which occasions the meat to be coarse grained, dark colored, bad flavored, hard, and full of gristle; and cattle, in particular, to have large heads, large coarse horns, huge necks and shanks, lean lank backs, inferior hides, and deteriorates the whole animal, making him rakish and ill-natured; and in sheep, occasions the mutton to *taste* of the *wool*, as it is absurdly termed. The following particulars of the weight of a Hertfordshire ox, belonging to Mr. Westcar, may perhaps throw some light on this subject:

The four quarters, skirts, and kidneys, 1,838 lbs.; loose fat, 190 lbs.; hide and horns, 119 lbs.; head, brains, and tongue, 56 lbs.; feet, 33 lbs.;

heart, lights, sweetbread, and bladder, 56 lbs ; tripe, seck, reed, liver, gall, and milt, 62 lbs.: total, 2,354 lbs. And a heifer, fed by Mr. Vise, by my crick bull, weighed as follows: four quarters 1,376 lbs.; fat 173 lbs.; hide 99 lbs.; and cut full seven inches solid fat along the chine, loin, and rump. And another heifer, by the same bull, shown in Smithfield by Sir John Sinclair, was so fat and heavy, that when it lay down it could not get on its feet again without help; the frame being so loaded with flesh.

The best kinds of these cattle, when fat, generally yield full three-fifths of their live weight in beef, namely: a four-year-old ox of mine weighed, when alive, and before he was fasted, 2,100 lbs.; and his four quarters weighed 1,260 lbs. The climate of England is, no doubt, highly favorable to the raising of fine live stock; but is it not, in a great measure, the skill of her graziers, in selecting their breeding animals, that occasions them to fatten so readily, and to yield so great a proportion of superior meat on the finest parts of the animal in proportion to its weight? And perhaps the following observations on Herefordshire cattle, (which, some years since, I addressed to a distinguished Kentucky grazier, who had imported several of that breed,) may give some information on the usual mode of handling and selecting cattle by graziers.

The best blood of the Herefords have the face, feet, belly, and end of the tail white, with a small piece of white on the top of the shoulder, but by no means a white back, and the rest of the animal a dark mahogany red; hide rather thick, soft, and feels between the fingers like rich fat, covered with fine soft thick-set hair, which occasions the skin to feel like a piece of fine rich silk velvet; lips thin; nostrils wide; eyes bold, and dark colored; eye sockets prominent and wide apart; ears and face rather short; the tongue roots rather full; no loose dewlap; bosom not prominent, but wide; belly or paunch small, and drawn upwards; horns yellow-white, turning upwards, rather long, very smooth and bright, free from wrinkles, and fine—not resting *on*, but growing *out of* the sides of the head; neck thin and fine; chine, when lean, thin, well and neatly joined to the loin; but when fat, very broad and particularly full at the sides—the shoulders fitting it equally as nice as in a blood horse, without any projection of the elbows; ribs long, very wide, not hanging from, but rising out from the backbone; and when the animal is fat, the flesh ought to be so much higher than the backbone as to form a hollow along the same, like a gutter; and I have seen such a hollow so deep, that when a stick was laid across the animal's back in various places, and resting on the flesh on each side, a ruler three inches long has passed along the backbone, under the stick, without touching it. The short ribs at the sides of the loin very projecting, long, elevating, and thick at the ends with fat, and deeply covered with firm solid flesh; for on this deep fat *firm* flesh depends the fineness of the "sirloin," and on the *firmness* of the flesh depends the *fineness* of the grain and sweetness of the animal. And here many people err in supposing that softness of flesh is a token of fine meat, but rather say of coarse-grained meat of a loose texture. Hips wide apart, remarkably large and fat, so that when the hand is placed on them, they feel like the back of a man's head, and a very fat head, too. Rump remarkably long, wide, flat, and full of wide firm flesh; indeed, it is in the rump, loin, and chine, that the Herefords chiefly excel, which occasions these parts of them to sell in London to the beefsteak houses for nearly double the price of those from some other kinds of cattle. Twist, or where the hind legs unite, very low and full; the outside of the thigh rather flat

and free from flesh, which occasions the round to be nearly free from coarse and dark-colored meat, but still large and fine; flank full, and driving forward when the animal is walking.

The peculiarities of these cattle are—lightness of offal; length, fulness, and size of the rump; size and fatness of the hips, and every part that gentlemen usually eat remarkably full of fine fat beef, with but a small proportion of coarse meat.

As milkers, the Herefords are perhaps equal to any other distinguished feeders; but here a distinction must be made, as none of the famed beef cattle are good milkers, or rarely so. Indeed, we ought not to expect it; it is too much like blowing hot and blowing cold with the same breath.

In speaking well of the Herefords, I by no means intend to undervalue the improved Durham cattle; and the distinguished Kentucky gentleman above alluded to lately told me, in our Capitol, that he thought he had produced a better animal than either of these breeds, by crossing them together.

But I am inclined to think that some of the Scotch cattle are better calculated for our country here, than any of the very large English breeds, and particularly the best pelled or Galloway cattle. They, like their countrymen, are hardy, and thrive almost every where; and these cattle are large enough for all purposes and pastures.

If the above observations are of any use, I shall have pleasure in having communicated them to you.

And remain, most respectfully, your obedient servant,

STEPHENSON SCOTT.

Hon. H. L. Ellsworth.

No. 41—(1.)

From the American Agriculturist.

PACKING PROVISIONS FOR THE ENGLISH MARKET.

We think we cannot do our readers a greater service than copying the following article, addressed to Messrs. Hitchcock, Livingston, & Co., from an American gentleman, now in England, who has paid much attention to the subject. If properly cured and packed, Great Britain and her East and West India colonies would take nearly all our surplus provisions. It is of great importance to us, then, to adopt their most approved methods of packing; and, if necessary, even to sacrifice a little to their whims and prejudices. But the English method is undoubtedly far superior to our own; and it is certain that we shall not command the market there, until we adopt it. The sooner, therefore, it is done, the better it will be for the interests of all parties concerned.

Pork.—This is cut into four or six-pound pieces, according to the size of the hog. Where the carcass weighs two hundred and fifty and under, it is cut into four-pound pieces; large hogs are cut into six-pound pieces. The hog is first slit through the backbone in half, then passed to the trimming block, where the half head and legs are cut off, the leaf and tender loin taken out, and the whole side split lengthwise through both the shoulder and ham, and as near the centre as is consistent with the proper shape and size

of the different pieces. From the block the strips pass to the scales, where the weight is ascertained and called to the man at the cutting block, who divides each strip into the requisite sized pieces. Both the splitting and piercing require skill and judgment, as much depends upon having the pieces well and sizably cut. From thence it goes to the rubbing table, where each piece is thoroughly rubbed in salt, in the same manner as in curing bacon. After the salt has been well rubbed in, it is put into pickling tubs holding from three to five hundred pounds, well covered with salt, but no water or brine added. Here they remain from eight to ten days. It is taken to the washing trough or vat, where each piece is thoroughly washed in clean brine, trimmed, and *tormented*, (as the process of trying is called.) The *tormentor* is an instrument of wood or metal, the size of a small dish, and is thrust into the lean parts of each piece, to ascertain that it is properly cured and free from taint. It is then messed and weighed, so that the requisite number of pieces shall weigh exactly the number of pounds for the barrel or tierce. It is then put up in the proper packages, and freely salted while packing, and saltpetre added at the rate of a common wine-glass full to the hundred pounds. The last layer is pounded in by a heavy iron weight, and capped with coarse salt. It is then passed to the cooper, who puts in the head, and puts on to the barrel one, and on the tierce at least three iron hoops at each end. The package is then filled with clean strong brine, bunged tight, branded, and is then ready for market.

The great utility of this method of curing consists in the certainty of the meat keeping in good condition for years in any climate. The blood gets all drained out of the meat before it is barreled, and hence one great cause of injury is avoided. I saw pork and beef which had been two years in the barrel, which was as sweet as when first put up, and the brine was perfectly clear. A friend in London unpacked several packages of Irish and Hamburg cured provisions by the side of American. The contrast was any thing but flattering to our taste or skill. I could very readily see why our beef and pork bore so bad a name in the market, and was so much of a drug. The meat was not inferior, but it was badly messed, worse cut and cured, and the brine nearly as red as blood; and presenting, by the side of the other, not a very *palatable* appearance. The large hogs, or heavy pork, which is uniformly cut into six-pound pieces, is packed in tierces, and is then called India or navy pork. The four-pound pieces are put in barrels.

A barrel of prime pork should contain from 25 to 30 pieces, cut from the ribs, loins, chines, and belly pieces, all lying between the ham and shoulder, forming what is called the broadside or middle. Three hams and two hind-leg pieces, or three hind-leg pieces and two hams, and fifteen or twenty pieces from other parts of the hog, except no part of the head. The meat must be of prime quality, firm, and well fattened; cut into four-pound pieces, exactly 50 to the barrel, and weigh not less than 200 pounds nett; and must have a good capping of St. Ubes or other coarse salt. This is indispensable.

Bacon mess pork is so called when the full proportion of prime pieces in *prime mess* is withheld. There are therefore various classes of bacon pork. Tierces contain the same number, (that is, 50 pieces of six pounds;) and the same rules as to messing are to be observed as in the barrel. The tierce must have not less than 300 pounds, and well capped with salt. It is usual to put in 52 pieces. In bacon mess, the number of prime mess

pieces should be marked upon the head. No part of the hog's head is allowed in any instance.

Beef.—This is uniformly cut into eight-pound pieces, and cured in all particulars precisely like pork, except a larger proportion of saltpetre is used in packing. Beef is almost entirely packed in tierces. For export, tierces only should be used.

A tierce of prime India beef should contain 42 pieces, eight pounds each, and weigh not less than 336 pounds nett. It should be made from well-fed bullocks, and contain 32 pieces of loins, flanks, rumps, plates, buttocks, and briskets; 10 pieces, consisting of four chines, two mouse buttocks, two shells of rumps, two pieces cut up close to the neck, with bone taken out—no shins, thigh bones, or neck. To be well salted, and capped with St. Ubes or other coarse salt.

A tierce of prime mess beef should contain 38 pieces of eight pounds, and weigh not less than 304 pounds nett. It should be made from prime fat cows, or heifers; twenty-eight pieces of prime from loins and chines, with one rib in each, flanks, rumps, plates, brisket, and buttocks; with 10 coarse pieces, consisting of two neck pieces, (not the scrag,) two thighs or buttock bones, with some meat to them, two shells of rumps two or even four chines, not cut too close to the neck, and two shoulder pieces, with part of the blade bone in them, well salted, and capped with St. Ubes or other coarse salt.

The tierces, whether for beef or pork, must be made of well-seasoned oak, with eight wooden and three iron hoops on each end. No pains to be spared in preparing and putting up, as the neat and tasty appearance of the packages will insure a more ready sale than if put up in a slovenly manner.

It may be useful to yourself, or to your neighbors, to see the mode of cutting up the carcass of an ox in London. The provisions exported from that metropolis rule the trade in the West India islands and in other distant places abroad. It is very proper, therefore, that American packers should understand the English method.

The annexed cut will show the London mode:

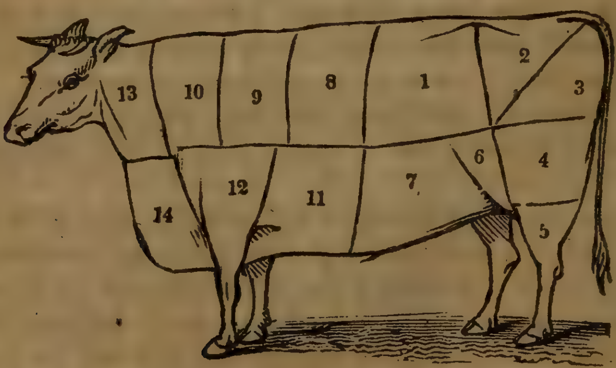


Fig.—Cutting up an ox in London.

Hind quarter.	*Fore quarter.*
1 Loin.	8 Fore rib.
2 Rump.	9 Middle rib.
3 Aitch, or adze bone.	10 Chuck rib.
4 Buttock.	11 Brisket.
5 Hock.	12 Leg of mutton piece.
6 Thick flank.	13 Clod and sticking, and neck.
7 Thin flank.	

No. 14.—This, properly speaking, is the brisket, and is left out in the English cut. In a good ox, of the Durham breed, it is a great point, and it gives very choice pieces for packing India beef, as they are good meat, and perfectly free from bone.

The relative value of these different cuts of an ox may be stated at their current value, viz: when the rump, loins, and fore ribs, of a fine ox will fetch eight pence a pound, the thick flank, buttock, and middle rib, will fetch six pence; the aitch or adze bone, thin flank, chuck rib, brisket, and leg-of-mutton piece, five pence; the clod and sticking, and neck, three pence; and the legs and shins, two pence a pound. Such is the difference in value of the different cuts of an ox in the meat markets of London.

It is well to observe, that the greatest attention should be paid to the making brine or pickle, whether for beef or pork. Pure water should be used in its manufacture; for the sediment from that which is impure will settle down upon the meat, and give it a bad color and a slimy feel. Where river or rain water is used, (and soft water should always be preferred,) it would be exceedingly desirable to filter it through sand, or at least to strain it. A great deal of beef and pork is utterly unfit for exportation, by the use of unfiltered water in making the brine.

In packing provisions, the tierces, barrels, &c., should be made with great care and neatness. Clean, handsome ash staves are preferred, and of such other hard close-grained wood as will not stain the meat. Tierces should have four iron hoops, or three—one at the bilge and one at each chime. Barrels with an iron hoop at each chime. The fuller-hooped the barrel or tierce is, the better.

We noticed, recently, that the first year after the modification of the British tariff, up to 31st August, 1842, 3,367 barrels only of American beef were imported into Liverpool. The past year, up to 31st August, there were imported into the same place 9,812 barrels, and 10,789 tierces of beef. If we would only pack our beef neatly by the above directions, the importations in 1846 might double those of 1844; and a great increase likewise will be made in the importation of pork.

No. 41—(2.)

PRICES CURRENT OF AMERICAN PRODUCE.

[Per "Cambria" steamer.]

Articles.	Prices. £ s. d.		Prices. £ s. d.	Duties. Foreign.	Duties. Colonial.
Beef, India, and extra qualities, in bond, per tierce	None.				
U. States, prime mess, old, in bond, per tierce	2 12 0	a	3 0 0	8s. per cwt.	
U. States, prime mess, in bond, per bbl.	1 12 0	a	1 16 0		
U. States, prime, inferior and old, in bond, per tierce	2 0 0	a	2 5 0		
Canadian, prime mess, in bond, per tierce	None.			-	
Canadian, prime mess, in bond, per bbl.	1 6 0	a	1 8 0	-	2s. per cwt.
Canadian, inferior and old, in bond, per bbl.	1 2 0	a	1 4 0	-	
Pork, U. States, prime mess, in bond, per bbl.	2 6 0	a	2 10 0		
U. States, prime, in bond, per bbl.	1 17 0	a	2 0 0	8s. per cwt.	
U. States, middles, in tierces, in bond, per 336 lbs.	3 15 0	a	4 0 0		
Canadian, prime mess, in bond, per bbl.	2 10 0	a	2 14 0	-	
Canadian, prime, in bond, per bbl.	2 4 0	a	2 6 0	-	2s. per cwt.
Canadian, middles, in tierces, duty paid, per 336 lbs.	5 10 0	a	5 16 0	-	
Bacon, in dry salt, duty paid, per cwt.	None.			14s. per cwt.	3s. 6d. per cwt.
Hams, dry, in bond, per cwt.	1 8 0	a	2 0 0		
Lard, fine leaf, in kegs, duty paid, per cwt.	2 2 0	a	2 6 0		
secondary quality, in bbls., duty paid, per cwt.	1 16 0	a	1 18 0	2s. per cwt.	6d. per cwt.
inferior, duty paid, per cwt.	1 12 0	a	1 14 6		
Butter, U. States, prime, duty paid, per cwt.	None.			£1 per cwt.	
Canadian, duty paid, per cwt.	4 2 0	a	4 3 0	-	5s. per cwt.
grease, duty paid, per cwt.	1 16 0	a	1 18 0	1s. 8d. per cwt.	1d. per cwt.
Cheese, prime quality, duty paid, per cwt.	2 10 0	a	2 14 0		
ordinary, duty paid, per cwt.	2 4 0	a	2 8 0	10s. 6d. per cwt.	2s. 6d. per cwt.
inferior, duty paid, per cwt.	2 0 0	a	2 3 0		
Ox tongues, in pickle, duty paid, per dozen	16 0	a	18 0	10s. per cwt.	2s. 6d. per cwt.
Tallow, duty paid, per cwt.	2 0 0	a	2 1 0	3s. 2d. per cwt.	3d. per cwt.
Ashes, Montreal, pot, duty paid, per cwt.	1 3 0	a	1 3 6	-	Free.
Montreal, pearl, duty paid, per cwt.	1 5 0	a		-	
U States, pot, duty paid per cwt.	1 3 0	a	1 3 6	6d. per cwt.	
U. States, pearl, duty paid, per cwt.	None.				

Beeswax, unbleached, duty paid, per cwt.	7 0 0 a 7 15 0	2s. per cwt.	1s. per cwt.
Flour, U. States, duty paid, per bbl.	1 7 0 a 1 8 0	As per average below.	As per average below.
U. States, in bond, per bbl.	17 0 a 17 6		
Canadian, duty paid, per bbl.	1 5 0 a 1 7 0		
Canadian, sour, duty paid, per bbl.	1 4 0 a 1 5 0		
Wheat, U. States, duty paid, per 70 lbs.	None.		
Canadian, duty paid, per 70 lbs.	None.		
Peas, Canadian, duty paid, per 504 lbs.	1 14 0 a 1 16 0		
Barley, Canadian, duty paid, per 60 lbs.	4 0 a 4 6		
Indian corn, duty paid, per 480 lbs.	1 10 0 a 1 12 0		
Oatmeal, Canadian, duty paid, per 240 lbs.	1 3 6 a 1 4 6		
Flaxseed, duty paid, per hhd.	3 6 0 a 3 7 0	1d. per quarter.	1d. per quarter.
Cloverseed, duty paid, per cwt.	2 10 0 a 3 0 0	10s. per cwt.	5s. per cwt.
Linseed cake, duty paid, per ton	7 15 0 a 8 10 0	1s. per ton.	1s. per ton.
Rape cake, duty paid, per ton	6 10 0 a 7 0 0		
Hemp, dew-rotted, duty paid, per ton	22 0 0 a 23 0 0	1d. per cwt.	1d. per cwt.
Lead, pig, duty paid, per ton	15 10 0 a 16 0 0	£1 per ton.	5s. per ton.
Bones, mixed, duty paid, per ton	4 0 0 a 4 10 0	6d. per ton.	6d. per ton.
Lard oil, duty paid, per tun	42 0 0 a 43 0 0	20 per cent.	10 per cent.
Hides, wet salted, duty paid, per lb.	3½ a 3⅝	3d. per cwt.	1d. per cwt.
dry, duty paid, per lb.	5 a 6	6d. per cwt.	2d. per cwt.
Quercitron bark, Philadelphia, duty paid, per cwt.	7 9 a 8 6	3d. per cwt.	1d. per cwt.
Horns, buffalo, duty paid, per cwt.	1 2 6 a 1 4 0	1s. per ton.	1s. per ton.
Tar, duty paid, per bbl.	11 0 a 12 0	2½d. per bbl.	½d. per bbl.
Turpentine, duty paid, per cwt.	6 0 a 8 0	1d. per cwt.	1d. per cwt.

	Wheat.	Oats.	Indian corn.	Peas.	Flour.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Average price of the six weeks, which regulates the duty	2 5 8	1 1 9	1 14 11	1 15 11	
Duty during the present week	1 0 0	6 0	4 0	7 6	12 0½
Duty on colonial produce	1 0	2 0	6	6	7½

Five per cent. extra is charged on the amount of the above duties; provisions for export or ship stores pay no duty; hams and bacon in pickle pay duty as pork. The cwt. is 112 lbs.; the imperial gallon is 9 lbs.; the tun is 252 imperial gallons; the quarter is 8 bushels; the barrel of provisions is 200 lbs.; the tierce is 304 lbs. A shilling is equal to 24 cents.

Imports of North American produce, from 1st to 31st December, 1844, inclusive.

	Beef.		Pork.	Hams.	Tallow.		Lard.		Butter.	Cheese.		Ashes.		Hides.	Wheat.	Flour.
	Tierces.	Barrels.	Barrels.	Casks.	Hhds.	Barrels.	Barrels.	Kegs.	Casks.	Casks.	Boxes.	Pot.	Pearl.		Quarters.	Barrels.
From the United States -	364	-	990	1	187	143	2,412	2,558	-	649	1,563	161	-	1,393	-	162
From Canada - -	-	158	157	-	-	-	-	12	1,189	17	-	2,266	592	-	1,536	1,556

LIVERPOOL, *January* 3, 1845.

The result of the trade with America, during the past year, in provisions, and other articles of modern import, warrants us in speaking with still more confidence of its growing importance; for, while the aggregate imports show a considerable excess over those of the previous year, the real advance which the trade has made has been much greater, and more encouraging in other respects, than the mere increase in imports would evidence. In the previous years, large shipments of various articles were made in complete ignorance of the qualities suited to the English markets, and which resulted, generally, in loss to the shippers; whereas the operations of the past year, being regulated by the known wants of our market, and the guidance of past experience, have not only been attended with profit to those concerned, but have served also to place the trade on a more safe and permanent footing. The position of our market, too, in regard to stock, presents a favorable contrast to the preceding year; there being no accumulation of old and inferior parcels to interfere with the imports of the new season. Thus the stock of the following articles on the 31st of December, 1844, was only—of beef equal to 3,427 tierces, pork 3,000 barrels, lard 100 tons, and cheese 160 tons, against 6,080 tierces beef, 863 barrels pork, 696 tons lard, and 285 tons cheese, on the same date in 1843; so that future arrivals will be met at once by the current demand as they come on the market. Under these circumstances, the prospects for a good and extending trade are more favorable than they have been at any former period since it opened.

In the past month, the arrivals of all produce to our port have been unusually small, owing to the uninterrupted continuance of easterly winds for the last few weeks. Stocks are, in consequence, very low, which, joined to the usual disposition evinced by buyers to avoid purchases as much as possible at the close of the year, has led to a restricted business in most of the articles which we quote.

In beef, the transactions have been few, from want of stock to operate on—the whole quantity in stock reported above consisting of inferior and unsuitable parcels. *New* is, consequently, much wanted; the few parcels that have arrived, so far, having met with immediate sale from the quay at 72*s.* 6*d.* for "prime mess," while 80*s.* was obtained for a small shipment of "family" beef. Equal rates will be secured for all the early arrivals of prime quality; and though some reduction will take place as supplies increase, yet there is a prospect of a higher range of prices being maintained throughout the whole season than were current last year, while the absence of Irish from the market will secure a more steady and continuous, as well as a more extensive demand. The quotations above are still given for *old.* We have no change to notice in the value of old pork, which goes off slowly within the range of our quotations, while Irish continues to realize equally high rates as at the date of our last advice. A few parcels of new American have arrived, all of prime quality, and showing a decided improvement on any former imports—one of them being superior to the usual brands of Irish "prime mess"—and which was sold from the quay ot 61*s.* A higher rate will be obtained for parcels of similar quality arriving in the course of this month, and a continued supply of such quality would soon place American on an equal level with Irish in regard to price. The result of these late shipments proves the correctness of the opinion we have already expressed, that American curers possess advantages, both as regards the quality of

their pork and its cheapness of price, which, if rightly improved, will enable them to furnish the principal portion of the pork required by the English markets, as they already are likely to do with respect to beef. There being a considerable export demand for pork in this market, which can be much increased by continuous supplies of prime qualities at moderate rates, we would strongly recommend the trade to the notice of all parties who are interested in its extension.

Cheese has not had quite so free a sale during the month, the advanced prices asked being unwillingly paid by buyers. The prospects of the market, however, are still favorable—a further advance in price being much more likely than any decline from present rates. No decline in the value of cheese can in fact take place while our markets for other provisions remain in their present position; and as the late advices from America bring higher quotations from thence, with lessening shipments, the small stock held here is likely to be brought within still smaller compass before the end of the present month. Our market offers, therefore, every inducement for continued shipments, with the certainty of giving paying returns.

With regard to butter, we have only to confirm our previous advices, that shipments of middling and inferior qualities would result well; the duty being no obstacle in the present scarcity of Irish butter, which has again advanced from 4*s*. to 6*s*. per cwt. during the month. Grease butter would also have a free sale.

Lard has continued to meet a ready sale at our quotations, which do not vary from those of last month, except for the purest leaf in kegs, on which an advance of 2*s*. per cwt. has been obtained. In the early part of the month there was some advance made on the finest qualities in barrels also, but which was again lost as supplies increased. The demand for such will, however, continue good; the high value of butter having thrown consumption more upon lard, and the supply of Irish being unequal to meet the increasing demand. A process of bleaching American, and preparing it for culinary purposes, has been discovered, which is likely to lead to its extensive substitution for Irish. The middling and inferior sorts, suitable for manufacturing purposes, are already at their extreme value relatively with tallow, and are not likely, therefore, to alter materially from present rates. The stock, it will be observed, is light, as compared with the commencement of last year. The market for tallow has been dull throughout the month, and has declined 6*d*. to 9*d*. per cwt.; and as the home supply is found to be considerably in excess of that of former years, it is not probable that any advance will now take place on present rates, especially as the demand usually slackens after Christmas. No further decline is looked for, the market being now steady.

Ashes have further declined in price, several parcels of pot having changed hands at 22*s*. 9*d*., and extensive sales taking place at 23*s*., which is now the current price, though some holders do not offer under 23*s*. 6*d*. 25*s*. is the nominal value for pearls.

Hides have had a dull sale, and North American wet salted must be quoted $\frac{1}{8}$*d*. per pound lower, 3$\frac{5}{8}$*d*. being now the highest quotation. The total stock of hides on 31st December last was 209,985 against 296,137 on 31st December, 1843: the former includes 1,921 North American. There have been no transactions in American hemp to record. Beeswax has not sold freely, and is lower—£7 15*s*. being now an extreme quotation.

Flaxseed has been arriving freely, and sales to some extent have been

made at 66*s*. and 67*s*., which is its present current value; but, in consequence of the great deficiency this year from the usual quantity exported from Riga to Ireland, there will be a large demand upon American, and which will lead to higher prices as the season advances. The season is still too early for any transactions of consequence in clover seed, the value of which at present is quite nominal. The prospects for the article are good, and high prices will be obtained for prime parcels. The sale for linseed cake has improved, and higher prices are now paid for the best parcels, with the prospect of a continued good demand during the winter.

Our corn market has kept very quiet throughout the month, (which, however, is usually the case in December,) all parties being indisposed to increase their engagements at the end of the year, if they can avoid it. Wheat and flour remain at low prices; but an opinion is generally held, that some movement upwards will take place after the turn of the year. The sale for Canadian flour is not brisk, the supplies of English and Irish being large, and the quality giving great satisfaction to the bakers. Sales of United States in bond, to the extent of 1,200 barrels, have been made at 17*s*. 6*d*.; which is some advance on previous rates.

We are yours, respectfully,

J. & C. KIRKPATRICK.

No. 41—(3.)

Prices current of American produce at Liverpool, January 3, 1845; made up from actual transactions.

Names of articles.	£	s.	d.		£	s.	d.	Duty.
Ashes, pot, duty paid, per cwt.	1	1	0	a	1	2	0	6d. per cwt.
pearl, duty paid per cwt.	Uncertain				-		-	
Beef, mess, per barrel	1	8	0	a	1	13	0	
mess, new, per barrel	1	14	0	a	1	18	0	
prime, per barrel	1	2	0	a	1	4	0	
prime, new, per barrel	1	4	0	a	1	6	0	
mess, per tierce	2	10	0	a	3	5	0	8s. per cwt.
mess, new, per tierce	3	5	0	a	3	15	0	
mess, family, new, per tierce	4	0	0		-		-	
mess, family, new, per barrel	2	0	0	a	2	4	0	
Beeswax, unbleached, duty paid, per cwt.	7	0	0	a	7	12	6	2s. per cwt.
Butter, prime, duty paid, per cwt.	None				-		-	20s. per cwt.
Canadian, duty paid, per cwt.	4	4	0	a	4	8	0	5s. per cwt.
grease, duty paid, per cwt.	None				-		-	1s. 8d. per cwt.
Bones, shank, duty paid, per ton	5	10	0	a	6	0	0	6d. per ton.
mixed, duty paid, per ton	4	0	0	a	5	0	0	
Castor oil, per pound	0	0	4½	a	0	0	6	1s. 3d. per cwt.
Cheese, first quality, duty paid, per cwt.	2	10	0	a	2	15	0	
ordinary, duty paid, per cwt.	2	6	0	a	2	8	0	10s. 6d. per cwt.
inferior, duty paid, per cwt.	2	0	0	a	2	4	0	
Clover seed, duty paid, per cwt.	2	5	0	a	2	10	0	10s. per quarter.
Flax seed, duty paid, per seven bushels	3	5	0	a	3	8	0	1s. per quarter.
Flour, Western canal, per barrel	0	17	6		-		-	12s. per barrel.
Hams, in salt, per cwt.	None				-		-	14s. per cwt.
in canvass, per cwt.	1	10	0	a	2	6	0	
Hemp, dew-rotted, duty paid, per ton	22	0	0	a	25	0	0	1d. per cwt.
Hides, wet-salted, duty paid, per pound	0	0	3½		-		-	3d. per cwt.
Horns, duty paid, per cwt.	0	18	0	a	1	2	0	1s. per ton.
Horn tips, duty paid, per cwt.	1	10	0	a	1	19	0	
Indian corn, duty paid, per 480 pounds	1	11	0	a	1	13	0	4s. per quarter.
Lard, fine leaf, in kegs, duty paid, per cwt.	2	4	0	a	2	6	0	
fine leaf, in barrels, duty paid, per cwt.	1	17	0	a	1	18	0	2s. per cwt.
inferior, duty paid, per cwt.	1	13	0	a	1	16	0	
Linseed cake, duty paid, per ton	8	0	0	a	9	0	0	1s. per ton.
Lead, pig, per ton	None				-		-	20s. per ton.
Oil, lard, duty paid, per tun	41	0	0		-		-	20 per ct. ad val.
palm, duty paid, per tun	25	0	0	a	26	0	0	6d. per cwt.
sperm, duty paid, per tun	87	0	0	a	92	0	0	£15 per tun.
whale, duty paid, per tun	27	0	0	a	31	0	0	£6 per tun.
Ox tongues, pickled, duty paid, per dozen	None				-		-	10s. per cwt.
Pork, thin mess, per barrel	2	10	0	a	3	0	0	
mess, per barrel	2	2	0	a	2	4	0	8s. per cwt.
prime, per barrel	1	16	0	a	1	18	0	
Quercitron bark, New York, duty free, per cwt.	0	7	6	a	0	8	0	3d. per cwt.
Philadelphia, duty free, per cwt.	0	7	6	a	0	8	6	
Rape, cake, duty free, per ton	5	0	0		-		-	1s. per ton.
Rice, dressed, per cwt.	0	14	0	a	0	16	6	6s. per cwt.
Rosin, duty paid, per cwt.	0	4	6	a	0	5	0	2s. per cwt.
Tar, duty paid, per barrel	0	11	0	a	0	12	0	2½d. per barrel.
Tallow, duty paid, per cwt.	1	19	0	a	2	0	6	3s. 2d. per cwt.
Turpentine, duty paid, per cwt.	0	7	0	a	0	7	6	1d. per cwt.
Whalebone, duty paid, per ton	240	0	0		-		-	20 per ct. ad val.
Wheat, per 70 pounds	None				-		-	20s. per quarter.
duty paid, per 70 pounds	-		-		-		-	

Quoted in bond, except when mentioned as duty paid. Five per cent. additional is charged on duties stated; but *provisions for export or ship stores pay no duty*. Hams and bacon, in pickle, pay pork duty.

A barrel is 200 pounds, a tierce is 304 pounds, a quarter is 8 bushels, a cwt. is 112 pounds, an imperial gallon is 9 pounds, a tun is 252 imperial gallons.

Aggregate average prices of foreign corn for six weeks, (which regulate the duty,) made up to December 21, 1844.—Wheat, 45*s.* 3*d.*; oats, 21*s.* 9*d.*; Indian corn, 32*s.*; peas, 35*s.* 11*d.*, per imperial quarter.

Duty during the present week.—Wheat, 20*s.*; oats, 6*s.*; Indian corn, 4*s.*; peas, 7*s.* 6*d.*; flour, 12*s.* 0¾*d.*, per barrel.

Duty on Canada grain.—Wheat, 1*s.*; oats, 2*s.*; Indian corn, 6*d.*; peas, 6*d.*; flour, 7½*d.*

Liverpool, *January* 3, 1845.

Dear Sir: I have much pleasure to note, at the commencement of another year, the favorable position of the American provision trade. The advances evident in the few samples of the new cure of beef and pork that have arrived, and the marked improvement and liberal supplies of cheese, give strong assurances of a permanent business in those articles; while a profitable trade in lard and tallow has only been limited by a want of supplies.

The following extract from the circular of an extensive cattle-dealing firm contains important corroboration of our anticipations of the growing success of the provision trade; and is the more valuable as it is written for the home market only, without any reference to American circulation, and certainly without any partiality shown to the trade:

"With respect to salted provisions, we shall have a permanently established business from America for beef and pork; hitherto it has been inefficiently conducted, through ignorance on the part of the Americans as to what would suit the English market, and sales here having had to be effected at considerable sacrifice, and a clearance of nearly all the injudicious selections and old and bad lots having been made, and experience regulating the basis upon which the shipments on the road, and which are preparing for this country [must be made,] will be the means of placing this trade in future in a methodical channel. From what has transpired, it is evident the Irish curers can have no chance of competing with the American importers in point of beef; but, with respect to pork, Irish maintains and is likely to maintain the pre-eminence, although some corn-fed pork of excellent quality was sold here last week at 61*s.* per barrel; which shows that, if America will really send the article required, price is a secondary object. Tierce middles, or bacon, of which there were a few arrivals in the early stage of this business, are not now looked for or thought of. Lard has been the steadiest article imported since the opening of this trade. The description, however, has been of various quality, very little amongst it suitable for culinary purposes—though, in consequence of the high price of Irish, it is inquired for now for that purpose; but it has become a staple article of commerce amongst the chandlers and lard pressers. United States or Canadian butter has been a small import during the year; and considering the high price of Irish, and rapid communication between this port and America, its not coming forward leads to a confirmation of the accounts that the Canadians have not turned their attention to it as an article of export; and that the duty from the States, added to the price there, would not make it a profitable shipment, even if the present high price of Irish could be obtained for it. The import of cheese from America has

been heavy; and although a large quantity has been of inferior quality, there have been some very prime parcels amongst it; and this article, like all the American provisions intended for this market, will, as the knowledge of the trade becomes extended, find a proper level. Of the continuance and permanence of our business with America for this article there can be no doubt, as they can send it good in quality, and moderate in price."

I have understood it would be acceptable to many parties to republish, at this time, the directions for packing some of the leading articles of import, although they have been already widely circulated, and do not possess the same interest they had two years since. They will be found annexed.

The threatened scarcity of money has not been realized. The rate in London is about 2½ per cent. This, with the continued employment of the manufacturing districts, and the entire absence of mercantile speculation, gives good promise for the results of the new year just commenced. The prevailing easterly winds have limited arrivals during the month of December, but transactions to a fair extent have taken place—for which, see remarks under the usual head.

With compliments of the season, I am, very respectfully,

JAMES McHENRY.

Review of the market for December.

Beef.—The small imports of new have been taken readily, on arrival, at extreme quotations. There is no doubt this market will be entirely dependent on America for supplies of beef.

Pork.—About 150 barrels new have arrived, so well handled as to realize at once prices nearly equal to Irish; showing that the low prices heretofore obtained were attributable to careless curing and packing, and not to quality of meat.

Butter continues scarce, and prices advance. With an import from Ireland equal to 1,000 firkins per day, the stock is less than same time last year.

Cheese.—A large business has been done, but dealers have submitted reluctantly to the advanced prices. The quality continues to give satisfaction.

Hams.—Sales of really fine small hams could be made at highest quotations, but there are none here.

Beeswax.—Sales at £7 12*s.* 6*d.* per cwt.; but it is questionable whether this price could be had for more, as the supplies are more than ample for the demand. This article does not enter as largely into manufacturing purposes as formerly.

Cloverseed.—The stock is undoubtedly light, but holders ask higher rates than buyers will submit to. Should increased supplies from the continent not arrive, a considerable advance on present quotations must be looked for; but there have been no sales this season of new American.

Flaxseed.—There have been considerable arrivals from New York; but holders prefer storing to accepting less than 70*s.* per tierce. The imports from Riga into Ireland being 16,436 barrels against 53,789 last year, leaves

a large balance of clean sowing seed to be made up by purchases elsewhere, and must cause prices to rule high during the season.

Flour.—Sales of 1,200 barrels in bond have been made at 17*s.* 6*d.*, which shows a gradual advance.

Indian corn has gone largely into consumption, and is used as a substitute for cattle-feeding articles, the price being relatively lower.

Lard.—45*s.* have been had during the month for fine leaf in kegs. This was an extreme price for a favorite parcel. 40*s.* to 42*s.* could be had for a fair article. Irish lard has advanced 8*s.* per cwt. during the month. Lard in barrels has also been selling freely at extreme quotations, but is now less in demand. The stock is only 100 tons, against 700 tons last year. The consumption in 1844 has been equally great as in 1843, with an advance in price equal to 4*s.* per cwt. during the last three months.

Tallow.—The large supplies from Australia, added to those from South America, have more than made up the small deficiency from Russia, and press down prices of North American, which, however, have advanced greatly in reputation. 40*s.* 6*d.* may now be given as the highest quotation for best quality, without any tendency to advance.

Linseed cake continues to advance, but there is no stock here from the United States.

Quercitron bark.—Sales to a considerable extent have been made at 7*s.* 6*d.* to 8*s.* The use of substitutes interferes with an active demand.

Taken for home consumption during the month of December, 1844, 356 tons lard, 2,600 barrels apples, 192 tons cheese, 8,000 bushels rice, 1,800 bushels indian corn, 108 tons quercitron bark. Paid on clocks £209, on chairs £15.

JAMES McHENRY.

Imports from the 1st to the 31st of December, 1844.

Montreal.—13,600 bushels peas; 996 barrels flour; 3,237 barrels pot ash; 509 barrels pearl ash; 71 barrels apples; 17 barrels cheese; 60 tierces flaxseed; 1,074 kegs butter; 9,767 bushels wheat; 14 tons linseed cake; 30 barrels pork.

Quebec.—10,914 bushels peas; 772 barrels flour; 467 barrels pot ash; 110 barrels pearl ash; 26 barrels apples; 101 barrels beef; 187 barrels pork; 18[illegible] kegs butter; 12 kegs lard; 10 barrels onions.

Boston.—35 barrels apples; 202 boxes cheese.

New York.—1,696 barrels apples; 365 tierces beef; 645 barrels pork; 2,612 barrels and 2,358 kegs lard; 547 casks and 1,498 boxes cheese; 45 casks sperm oil; 4,497 barrels turpentine; 135 hogsheads, 53 casks, and 43 barrels tallow; 25 barrels onions; 1,272 wet hides; 161 barrels ashes; 170 barrels tar; 121 tons ore; 1,730 tierces flaxseed; 11 packages beeswax; 1,411 pieces maple; 10 kegs and 41 hogsheads tobacco.

Philadelphia.—59 hogsheads tobacco.

New Orleans.—82 hogsheads tobacco; 178 bales hemp; 345 barrels pork; 4 tons bones; 27 hogsheads, 51 tierces, and 47 barrels tallow; 421 hides; 66 barrels lard; 112 barrels flour.

Imports into Liverpool.

Year.	Beef.		Pork.	Cheese.		Butter.	Hams.		Lard.		Tallow.	
	Tierces.	Barrels.	Barrels.	Casks.	Boxes.	Packages.	Loose.	Casks.	Barrels.	Kegs.	Hhds.	Barrels.
1843	3,500	5,005	2,956	4,922	19,004	13,060	-	623	23,962	24,650	1,600	2,200
1844	9,300	8,354	7,939	5,674	18,641	3,458	2,500	441	20,027	28,960	2,116	2,801

Stocks on hand at Liverpool, January 1, 1845.

Year.	Beef.	Pork.	Cheese.	Tallow.	Lard.	Beeswax.	Clover-seed.	Quercitron bark.	Flaxseed.
	Tierces.	Barrels.	Tons	Casks.	Tons.	Tons.	Tons.	Hhds.	Tierces.
1843	6,080	829	285	800	696	None.	190	1,550	None.
1844	3,127	3,368	160	200	100	10	60	1,650	1,200

Directions for preparing beef, pork, lard, and hams, for the English market.

Beef.—Kill fat cattle only. All parts are used but the head, feet, and legs; to be cut, as nearly as possible, into pieces of 8 pounds each. Pack away in store casks, with dry salt, well rubbed in; the casks to be filled up with pickle, sufficient saltpetre being added to give a bright color and proper consistency. In a day or two, or as soon as the blood is sufficiently purged out, the beef is to be removed to fresh pickle, where it remains until packed for exportation. Observe: saltpetre must not be used in any pickle after the first. Pickle should be strained, and strong enough to float an egg. To be packed in tierces containing 38 pieces, or 304 pounds, perfectly water tight, with two iron hoops at each end, and made just to fit. The edges of the pieces to be trimmed and laid in smoothly, firmly, and in layers. Between each layer some fine salt is to be used, and over the top of the whole an inch or two of very coarse Turk's island or St. Ubes should be placed.

Pork.—After killing, the hogs should be allowed to hang for twenty-four or thirty-six hours, to become quite firm. In curing, the same process is to be observed as in beef. To be packed for exportation in barrels of 50 neat square pieces of 4 pounds each. A barrel of prime mess pork should contain 4 pieces, fore leg to knee joint, with part of shoulder attached; 16 shoulder pieces; 10 belly pieces; 10 rib pieces; 10 chine or back-bone pieces. Each packer must brand his own name conspicuously on the head of his casks, with the number of pieces and description of beef or pork.

Lard.—Really fine lard for culinary purposes should be packed in neat white kegs of 40 pounds each. It should be poured in, and allowed to cool *before* heading. So much care is not required in barrel lard, which is chiefly used for chandlery purposes or machinery; but, if poured in before

heading, there would be a greater certainty of the packages being full when cool.

Hams—Belfast method.—After a hog has hung long enough to be firm, hams are cut out, and laid singly in rows on cold stone or brick floor, with a slight sprinkling of salt over them. After lying four or five hours, they are taken to the salting trough, and rubbed hard or scraped, for the purpose of softening and whitening the cuticle, distributing the juices, and preparing it to receive the salt; to be then laid on the floor as before, and half an ounce of finely powdered saltpetre sprinkled over each ham, then thinly covered with salt, and allowed to remain two days; to be then transferred once more to salting trough, and rubbed and scraped as before. They may now, to save room, be placed two deep on the floor, and thinly covered with salt. Here lie twelve days, then taken up and washed clean of salt, and hung in drying house, where a slow fire is kept up till *thoroughly* dried. To be then neatly trimmed and rounded with a knife, and packed for exportation in casks, with shooks or husks of Indian corn, to absorb the moisture.

JAMES McHENRY.

No. 42.

COTTON-SEED OIL, &c.

[The following account of cotton-seed oil, &c., from J. Hamilton Cooper, Esq., of Georgia, will be read with interest, as it shows the use which may yet be made of an article produced in large quantities, and before comparatively useless. A gentleman at the North is already making inquiries on this subject, which may lead to his embarking in this enterprise. It is not improbable, therefore, that cotton planters may rejoice to find an article of so little value hitherto may be converted into an important article of domestic and foreign use. It was received too late for reference in the report.]

The seed of the *Sea Island* or *long staple* cotton weighs about 40 lbs. to the bushel. As it is less coated with fibre, the yield of oil to the bushel will be considerably greater than that of the upland; but I am unable to say what it is. As the two kinds are only varieties of the same plant, it is presumed that there is no difference in the oil from the two.

Practically considered, the Sea Island cotton seed may be put out of the question, from its limited production, and the value set on it by planters as a manure.

From the experiments made on a large scale at Natchez, the oil from upland cotton seed was found, when well refined, to burn as well as spermaceti; it made also an excellent paint oil. There was, however, much difficulty in refining it, and so much waste in accomplishing it as to render the manufacture unprofitable. The processes employed were such as were then used in the Netherlands, France, and in America; but none of them were satisfactory. There is every reason to expect that the great improvements and discoveries now making in organic chemistry will soon supply a satisfactory process of refinement.

As there are 30 bushels of seed to every bale of cotton, each bale will yield at least 15 gallons of crude oil, and 360 lbs. of oil cake. If the oil can be made to be worth 50 cents per gallon, and the cake be sold only for

1 cent, an increase of $10 at least per bale will be given, which in 2,000,000 of bales will be $20,000,000.

Through the greater part of the Western country, the seed is absolutely thrown away, as the lands are too rich to be manured. The oil cake from cotton seed has been extensively used by me as feed for horses, cattle, and sheep, and was found to be excellent. It may be used with equal advantage with *rape cake* for food or manure.

Upland or Sea Island cotton seed may be obtained from any of the factors in Charleston or Savannah.

No difficulty exists in hulling, tempering, or expressing the oil. The huller of *Follet & Smith* of Petersburg, Virginia, accomplishes the first very effectually, at the rate of a bushel of kernel in four or five minutes; and the machinery employed in French Flanders for rape seed, &c., answers perfectly for cotton seed.

The present low prices of cotton will present a sufficient inducement to planters to save and sell the seed at reasonable prices; and it is believed that, if a cheap and effective mode of refining the oil can be discovered, this branch of manufacture will become one of very high value to the country.

J. HAMILTON COOPER,
Near Darien, Ga.

Memoranda of experiments made in January, 1836, *at Natchez, to ascertain the relative quantities of crude oil, cake, &c., from the seed of short staple or upland cotton.*

A.—200 grains (by weight) of seed of good quality, well dried in the sun, opened by hand, and the kernels carefully separated from the hulls and fibre, gave of

Kernels - - -	115½ grains, being	57¾ per cent.
Hulls and fibre - -	84½ " "	42¼ "
	200	100

B.—The same seed, after being well sun dried, were heated on a shovel over the fire, until they became crisp. They lost 2½ per cent. in weight.

C.—One bushel (even measure) of seed, heated during eight minutes in a drying kiln, was hulled by Follet's huller, and gave

Kernels - - - -	14½ lbs., or	54¼ per cent.
Hulls and fibre - - -	12¼ "	45¾ "

26¾ lbs. weight of 1 bushel of seed, *even* or *struck* measure.

D.—One bushel (heaped measure) kiln dried, gave

Kernels - - - -	16¼ lbs., or	54.17 per cent.
Hulls and fibre - - -	13¾ "	45.83 "

30 lbs. weight of 1 bushel of seed, heaped measure.

E.—Ten bushels of kiln-dried seed slightly heaped weighed - 301 lbs.
When hulled, they yielded 9½ bushels of hulls, &c., weighing 117 "
And 5 bushels of kernels, weighing - - - 184 "

Which 5 bushels of kernels, when kneaded into a paste under the stones, with 2 quarts of water, gave 3 bushels 18 quarts of tempered *meal*, which weighed -	198 lbs.
or $58\frac{1}{3}$ lbs. per bushel.	
F.—The average weight of a bushel of tempered meal is -	61 "
Deduct for water - - - - -	3 "
Leaves the weight of the kernel - - -	58 "

G.—One gallon of crude oil from the press weighed 7 lbs. 6 oz.

H.—One bushel of well-tempered meal, weighing 61 lbs., was pressed, and the cake retempered and repressed: it gave

1st pressing - - -	$6\frac{1}{2}$ quarts of crude oil.
2d pressing - - -	$2\frac{2}{3}$ " "
	$9\frac{1}{1}$ " "

Weight of the bushel of meal - - - -	61 lbs.
Weight of $9\frac{1}{10}$ quarts, at 7 lbs. 6 oz. per gallon, (G) -	$16\frac{3}{4}$ "
Leaves for weight of the *cake* - - -	$44\frac{1}{4}$ "

Results.

One bushel of seed weighing 30 lbs. gives 16 lbs. of kernel, which, when tempered and twice pressed, yields from $2\frac{1}{4}$ quarts to $2\frac{7}{10}$ quarts of *crude oil*, and $12\frac{1}{2}$ lbs. of *cake*.

No. 43.

The following letters from Messrs. Smeltzer and North were received too late to be noticed in the report; but, as they contain information on subjects which will interest many of the agriculturists of our country, it is believed that their insertion here will be gratifying to a portion of the readers of this document; and they are therefore inserted in this place, although somewhat out of their regular order:

FREDERICK COUNTY, MD.,
Bloomfield Farms, *February* 6, 1845.

SIR: Through the medium of the post office, I received your communication dated 31st January. It affords me pleasure to give you the required information in reference to the introduction of the China wheat into this country, and also the Oregon corn; together with such other information as may be necessary to promote the interest of the agriculturist.

In reference to the China (or, as it is very often called, hardware) wheat, its introduction into America is of a novel character. Nevertheless, it is true; having obtained my information from a source well authenticated, therefore worthy of credit. The history is this: A few years since, there was some China ware imported from the north of China, and, on opening a crate of the ware, there were a few heads of wheat found in it; the head being so very large and compact, and the grain being so far superior

to our American wheat, the discoverer was induced to plant those few grains, to make the experiment.

I have been experimenting for several years; and last year sowed 10 bushels of said wheat, which yielded 292 bushels, or about 42½ bushels to the acre. This wheat branches and grows very much like rye, and has never been injured by smut, mildew, or fly. It ripens from 6 to 8 days earlier than any of the common species of wheat.

I have obtained, through a gentleman from the Territory of Oregon, a kind which he stated was the native wheat of that country, and said to have grown there spontaneously for a great number of years. I sowed a small quantity of the Oregon wheat last fall; and, from present appearance, I think it well adapted to our soil and climate.

I will now direct your attention to the growth and nature of the Oregon corn, of which I obtained a small quantity from General William Henry Harrison, in 1839. He stated that it yielded more abundantly than any other corn he ever raised. I planted it, and can say its yield is more abundant than any species of corn within my knowledge. I raised from 4 acres, at one end of the field, 121½ bushels to the acre. It shelled 7¼ bushels to the barrel. It is well worth the agriculturist's attention; for my experience teaches me that its yield is at least 20 per cent. over our common species of corn. The Oregon corn should be planted from the 10th to the 25th of April. I planted mine last spring about the last of April; ploughed my ground in the spring, and planted it 3½ feet one way by 2 feet the other way—2 stalks in a hill. In my opinion, it is much better (when it can be done) to plough the ground in the fall.

The best mode I have ever tried to improve corn is to gather your liquid manure by sinking hogsheads, or something like tanner's vats, in or near your barn yard, so that you can conduct the water into them. Place a large cask or hogshead on two wheels; fill your cask or hogshead, and, with a pair of horses or cattle, draw it out on your corn field when the corn is 2 or 3 inches high; cover it over your rows of corn, with the spigot right over your row of corn; put a small sieve under your spigot, so as to sprinkle it over the corn. One hogshead of this liquid manure, applied in this way, is worth two loads of barn-yard manure applied in the usual way.

I will now give you my opinion on the growth of wheat, as regards the ravages of the fly. I have often wondered why it was that some wheat is more injured than others by this insect. I have come to the conclusion, by close observation, that wheat where the blade or leaf stands erect in the fall and early in the spring, is more subject to fly than the wheat where the blade or leaf keeps close to the ground; from the fact that the fly in all cases deposites its eggs in the groove or hollow part of the blade, which is a conductor, when the rain or dews fall on them, to carry them to the stalk; whereas, in wheat that lies close to the ground, the rain washes most of them off, and consequently they must perish.

A very good plan to prevent the fly from injuring the wheat is to take a log or roller, and roll or run it over your wheat in the fall and early in the spring, so as to keep it as close to the ground as possible; it is also a very good preventive of the frost from injuring the wheat by pressing or throwing it out.

Yours, very respectfully,

H. R. SMELTZER.

H. L. ELLSWORTH, Esq., *Commissioner of Patents.*

MIDDLETOWN, (CONN.,) *February* 6, 1845.

MY DEAR SIR: Your letter of the 25th ultimo, enclosing to me a quantity of seeds, has been received; for which I feel very grateful to you.

Agreeably to your request, I now enclose to you, by mail, about 700 squash seeds, with directions how to cultivate them, which are all that I have been able to procure as yet; but am in hopes of procuring a few more for you soon, and will send you all I can get.

I know of no squashes of the kind ever raised in this part of the country but by myself, excepting a few raised by my neighbors from seed that I gave them. On the receipt of your letter, I applied to them for some of the seed, but they had disposed of most of them before I received your letter.

Last spring I planted four or five seeds in my garden, and from them I obtained about 700 weight of squashes; and from one seed I had two squashes, each of them weighing more than 120 pounds, besides two or three smaller ones. One of them I sent to the institute, or fair, in the city of New York; for which I obtained the first premium in that institute for squashes, by the person that took charge of it, if he informed me right. The other I sent to the fair in this place, which was judged to be the best presented there.

The squashes, when ripe, are of a beautiful yellow color, of a fine grain, and good for pies. The seeds must be planted as early in the spring as the season will admit, without injury to the plant by frost; and the vine will grow until destroyed by the frost in the fall.

In preparing the land before planting the seeds, I take from my barn yard some *well rotted manure, mix with it wood ashes, slaked lime and a little sprinkling of fine salt; mix it well with the manure, which will prevent the cut worm from destroying the plants, and will give a vigorous growth to the squashes.* Put about one shovel full of it into each hill, mix it well with the soil; then plant the seed, by sticking the chit or sharp end of the seed downwards in the hill. I put only one seed in a hill; and in the dry season of the summer I occasionally water the plants with soap-suds. And from four or five seeds, cultivated as above stated, I can raise from 800 to 1,000 weight of squashes.

I am, sir, with much respect, your friend and obedient servant,

SIMEON NORTH.

HENRY L. ELLSWORTH, Esq.,
Commissioner of Patents, Washington, D. C.

No. 44.

From the Ohio Cultivator

THE RUST OR BLIGHT IN WHEAT. WHAT IS IT?

The *rust* (or, as it is sometimes called, the *blight*) is the great enemy of the wheat crop in this country, and especially in the Western States. Millions of bushels of wheat are annually lost to the farmers of Ohio alone, by this malady; hence any thing tending to throw light upon this subject is of vast importance to the community. Hitherto, very little of practical value has been known about this disease—at least by the majority of farmers. Each one has his own theory as to its nature, and the causes that produce it; and the theory of almost every one differs materially from that of his

neighbor, except that nearly all have settled down in the belief that, whatever may be its nature, the causes are beyond their control; and hence the evil must be submitted to, as one of the "dispensations of Providence." Some, however, are not willing to settle down upon such conclusions; and, as one of that number, it will be our aim to demonstrate, if possible, by *facts* and arguments, that the evil can be, in a great degree, if not entirely avoided, when farmers will properly investigate the operations of Nature, and rightly interpret and reduce to practice the lessons which she teaches.

Let us, then, kind readers, take up this subject in a reasonable and philosophical way; lay aside all our old *theories*, and go to work and examine *facts;* for the great error with most men in regard to such matters is, they begin by forming in their minds a *theory*, and then look for facts merely to support their theory. The consequence is, they fail to observe facts of an opposite character, and of course seldom arrive at the truth. First, then, let us examine—

What is the nature of the disease, or rust?—We find that farmers are no more agreed on this point, than in regard to its *cause*, or the means of its *prevention.* A multitude of *theories* have been advanced, and some of them ingeniously argued; though, as we shall presently show, not sustained by *facts.* It would be useless for us to devote the space that would be necessary to examine or define these different theories; so we will only mention one that seems to be most common—namely, that, owing to the state of the weather, or some other causes, the roots of the wheat absorb a greater amount of sap than can be properly elaborated or disposed of by the plant, and consequently the straw bursts or splits, and the sap exudes; that the *rust* which is seen on the straw is merely the dried sap, or, as some hold, a species of fungus that takes root in the exuded sap; in either case, regarding it (the rust) as the effect or attendant of the disease, and not the disease itself. Some have carried this theory further, and believed that the disease was owing to the *oxide of iron* being absorbed from the soil by the roots, and poisoning the plant, causing the stem to burst, and giving the appearance of rust to the exuded sap. But the fallacy of this supposition was soon shown by careful analysis of the rust itself, proving that it does not contain a particle of iron.

But what, then, are the *facts* respecting the nature of the disease? The annexed engraving, with a few explanatory remarks, will furnish an answer to this question, that we think must be plain and conclusive to every mind.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 1. Section of diseased wheat straw, slightly magnified, showing stripes of rust, or *fungi*, and the bursting of the *epidermis*.

Fig. 2. The *fungi*, or rust plants, greatly magnified, full grown, with the seeds escaping from two of them.

Fig. 3. Small bunch of *fungi*, more magnified, showing their attachment to the crevice or slit in the straw.

The examination of diseased wheat straw, by the aid of a good compound microscope, demonstrates most conclusively that the *rust* consists entirely of minute *fungi*—perfect *plants*, resembling small mushrooms, or toad-stools, and propagating their species by proper *seeds*. This is beautifully illustrated by the accompanying engravings, where fig. 1 is a section of wheat straw, with dark granulated stripes representing the rust; and on the sides can be seen the swelling up and bursting of the *epidermis*, or skin, of the straw. It is shown, by the microscope, that the *fungi* begin to grow *inside* of the straw, *beneath* this *epidermis;* and immediately on its bursting or splitting, it protrudes outside, and rapidly grows to its full size and perfection. The small figure (3) shows a cluster of these *fungi*, (magnified,) taken off the straw, and exhibiting their manner of attachment, by their roots, to the crevice or slit in the straw. The central figure (2) is a representation of a very small cluster of the *fungi*, full grown, and greatly magnified, showing their uniform shape, (though this varies somewhat,) and two of them scattering seed from their tops.

The quantity of seed they contain is very great, the large head or ball being filled with it. It is this that forms the fine red dust which floats in the air like vapor, in badly rusted fields of wheat. It resembles the smoke, or more properly the *seed*, of that well-known fungus, the *puff ball;* and may be carried by the winds from one farm to another, over vast districts of country, spreading the contagion to every field that is from any cause rendered in a fit condition for receiving the disease. Abundance of testimony could be adduced to prove the *contagious nature* of the disease; and also that it does not attack all fields alike, but is greatly influenced by soil and cultivation.

But it will be asked, if the rust or *fungi* are propagated by *seed* in this way, how is it that they commence growing inside of the wheat stem, as above stated? The answer is, such are found to be the *facts*, and it is with these we have mainly to do at present; the *how* and the *why* will be an after consideration. Suffice it to say, however, that these seeds are so exceedingly small, that they can, *and we suppose do*, pass into the plant through the *stomata* or air vessels of the leaves, and are carried with the descending sap into the stem. But this is only *theory*, deducible from the facts we have stated; for we have no actual demonstration on this point. Another explanation, (and to our mind a plausible one, though we have never seen it suggested by any other writer,) is, that the seeds of the *fungi*, on falling to the ground in the fields to which they are transported, are washed into the soil by rain, and taken up by the open mouths of the *spongioles*, or rootlets, and thus carried into the circulation with the food of the plant. This again suggests the probability that these seeds may remain in the soil, or be applied with straw and manure, so as to in this way infect the succeeding crop, if circumstances should be favorable to the development of the disease.

But it is easy to see that more minute and careful observations are necessary to decide these and many other points connected with this subject. We hope the foregoing will be sufficient to settle the question, What is rust? and serve as a basis for subsequent investigations.

We are aware that these statements will suggest many queries and speculations in the minds of our wheat-growing readers. We desire they should; and when they have had time to ponder over this chapter, we will give them another on the same subject.

E.

SYNOPSIS OF FEES, &c., FOR PATENTS IN FOREIGN COUNTRIES.

The British dominions.

The United Kingdom of Great Britain and Ireland is divided into three countries, for each of which separate patents must be obtained by any inventor who wishes to protect his invention throughout the whole of the British dominions: one for England and Wales, in which may be included the British colonies and possessions, by the petitioner signifying his intention to that effect; one for Scotland; and one for Ireland.

The average *ordinary* cost, if unopposed, and passed in the usual manner, without extra fees, will be, agent's commission included, as follows:

For England, Wales, and colonies, &c., about	$5 50
For Scotland	3 90
For Ireland	6 25
Three specifications	2 00
Total	17 65

The inventor or applicant for patents is not required to give a *detailed* description of his invention. He has only to sign a declaration before a master in chancery to the title of his invention, and he receives, after due proceedings are had, a grant of letters patent; after which, he has a certain time to specify—usually 6 months.

Applications for patents are sent from this country to England to an agent, who takes out the patent in his own name, and then sells or transfers the right, as the inventor directs. A patent of this kind is taken out as a communication from a foreigner abroad. Patents are granted for 14 years.

France.

Patents are granted in this country for 5, 10, or 15 years, at the option of the patentee. The application must be accompanied with a perfect description, written in the French language, and two sets of drawings. The term of a patent cannot, after it is granted, be extended. Every invention must be worked within 2 years after the date of the patent; otherwise, it may be cancelled. The cost will generally amount to about $300, and agent's fees. If a patent is taken out in ony other country subsequent to the date of the patent in France, the patent in France is void.

Belgium.

Patents for foreign inventions are not now granted for a longer term [illegible] 10 years, and sometimes they are restricted to 5 years; they may be prolonged, however, a few years, by applying before their expiration. The

invention must be worked in Belgium; and if the patentee imports any similar articles to those he has patented, the grant is liable to be rescinded. The specification must be written in the French language, with two copies of drawings. The invention must be worked within 2 years after the grant, or be liable to forfeiture.

Holland.

The specification written in English, and accompanied with two copies of drawings, may be sent with the application for patent in this country, which is granted for 5, 10, or 15 years, (as the applicant desires,) if it does not extend beyond the term of a foreign patent for the same thing; but a patent may be obtained for 5 years, and afterwards extended, if required, to a longer period.

Austria.

The specification must be made in German, and illustrated with drawings, if necessary. A patent can be obtained for 5 years, and afterwards extended to any time not exceeding 15 years in the whole. The invention must be worked within one year from its date, or be liable to forfeiture.

Prussia.

This Government exercises a discretionary power in granting patents. A complete specification and drawings are required; but no tax is charged, except a trifling sum for advertising, &c. Patents are granted for 5 years, and sometimes longer; and the invention must be put in practice within 6 months.

Russia.

Patents are granted in this country at the discretion of Government, by which their duration is fixed, which is for 3, 5, or 6 years; and, to insure their validity, they must not have been published in any country previous to the application here. The price for a foreign invention is, for 1 year, 60; for 2 years, 120; for 3 years, 180; for 4 years, 240; for 5 years, 300; for 6 years, 360 silver roubles. A silver rouble is about 75 cents.

Spain.

Patents of importation or introduction are granted in this country for 5 years, if no description can be found in the Conservatory of Arts in Madrid; or for any invention, the description of which has been deposited there for more than 3 years, and not publicly worked in Spain.

N. B.—In foreign countries, patents are granted to those who introduce them, as well as to inventors; but in the United States, the inventor or assignee can alone take a patent. If the inventor is a foreigner, the fee is for a foreign patent.

H.

Improvement in the magneto-electric machine, and application of this instrument to operate the magnetic telegraph.

The magneto-electric machine was originally contrived by Mr. Saxton, soon after the commencement of the interesting discovery of Faraday; that magnetism was capable of exciting electricity. The conditions necessary for obtaining electricity in this way were, chiefly, the disturbance of magnetic forces in a bar of soft iron surrounded by coils of wire. A number of mechanical contrivances were resorted to, in order to effect this disturbance, by causing the bar of iron, thus surrounded, to approach to and recede from the poles of powerful magnets; but the ingenuity of Mr. Saxton far exceeded them all, by giving to the coils and enclosed bar a rotary movement about the poles of a U-form magnet. This instrument afforded bright sparks and strong shocks; but the currents of electricity thus obtained could not be converted to any useful purpose, as, in each half revolution of the coils, the currents were in opposite directions. In 1838 Professor Page published in Silliman's Journal an account of an improved form of the machine, doing away with many existing objections, and furthermore rendering it at once a useful instrument, by a contrivance for conducting these opposing currents into one channel or direction, which part of the contrivance was called the unitress. The current produced in this way was capable of performing the work, to a certain extent, of the power developed by the galvanic battery; and the machine was found adequate to the furnishing of shocks for medical purposes, for exhibiting the decomposition of water, furnishing the elements oxygen and hydrogen at their respective poles, and producing definite electro-chemical results. These two last results could not be obtained without the aid of the unitress. But, with this improvement, the instrument was still wanting in one property of the galvanic battery, viz: that property which chemists call quantity, or that power upon which depends its ability to magnetize, and also to heat platinum wires. This last property has been given to the machine by the recent contrivance of Professor Page. The machine, in its novel construction under his improvement, developed what is called, by way of distinction, the current of intensity, but had a very feeble magnetizing power. By a peculiar contrivance of the coils, (not to be made public until his rights are in some way secured,) the current of quantity is obtained in its maximum, while, at the same time, the intensity is so much diminished that it gives scarcely any shock, and decomposes feebly. It has been successfully tried with the magnetic telegraph of Professor Morse, and operates equally well with the battery. It affords, by simply turning a crank attached to the machine, a constant current of galvanic electricity; and as there is no consumption of material necessary to obtain this power, it will doubtless supersede the use of the galvanic battery, which, in the event of constant employment, would be very expensive, from the waste of zinc, platinum, acids, mercury, and other materials used in its construction. It particularly recommends itself for magnetizing purposes, as it requires no knowledge of chemistry to insure the result, being merely mechanical in its action, and is always ready for action without previous preparation; the turning of a crank being the only requisite when the machine is in order. It is not liable to

get out of order; does not diminish perceptibly in power when in constant use, and actually gains power when standing at rest. It will be particularly gratifying to the man of science, as it enables him to have always at hand a constant power for the investigation of its properties, without any labor of preparation. We notice among the beautiful results of this machine, that it charges an electro-magnet so as to sustain a weight of 1,000 pounds, and it ignites to a white heat large platinum wires, and may be used successfully for blasting at a distance; and should Government ever adopt any such system of defence as to need the galvanic power, it must supersede the battery in that case. Professor Page demonstrates, by mathematical reasoning, that the new contrivance of the coils affords the very maximum of quantity to be obtained by magnetic excitation.

I.

MORSE'S ELECTRO-MAGNETIC TELEGRAPH.

The electro-magnet is the basis upon which this whole invention rests in its present construction; without it, it would entirely fail. The electro-magnet is produced by coiling around a bar of soft iron, made in the form of a horseshoe, (fig. 1,) copper wire previously covered, similar to bonnet wire,

Fig. 1

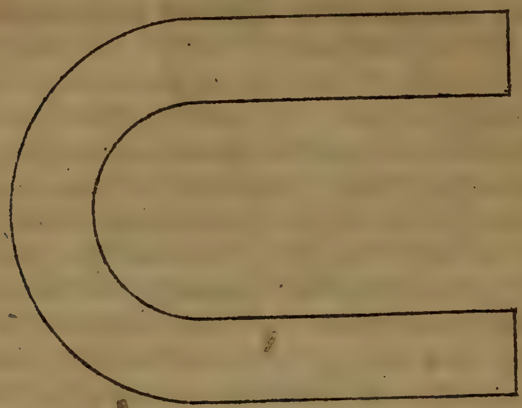
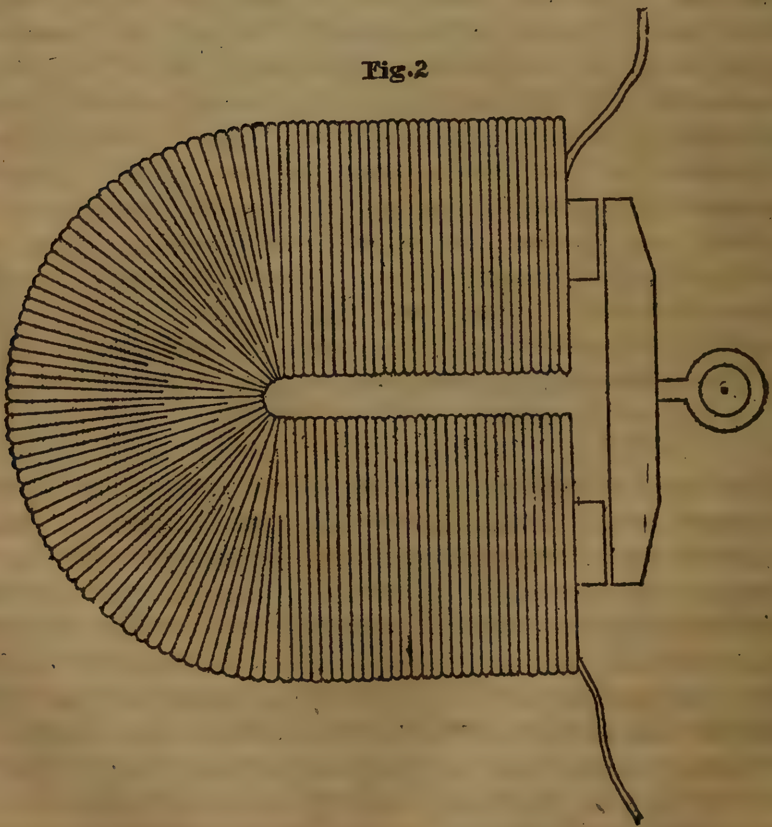


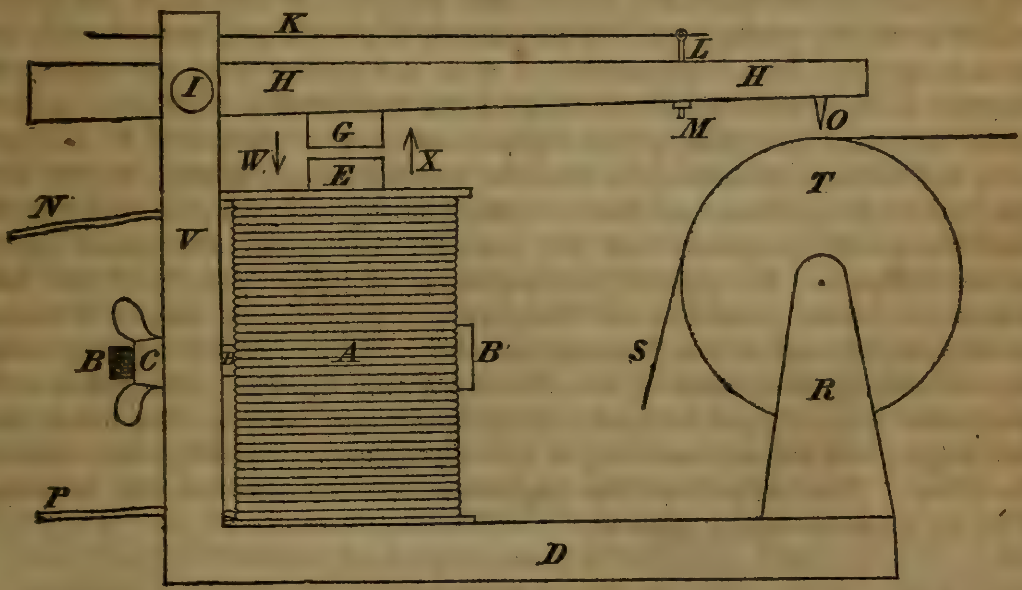
Fig. 2



and varnished to prevent metallic contact with each other and the iron, (fig. 2.) The two terminations of the wire, thus surrounding the iron in a spiral form, are brought out at each end of the curved bar, and are connected, one with the zinc pole of a galvanic battery, the other with the platinum; the

battery being prepared in the usual manner with its corroding acid, produces galvanic electricity, which starts off from one pole of the battery, follows the wire around the soft iron, and returns to the other pole of the battery by the other wire—thus forming a complete circuit. The galvanic fluid is now passing the whole length of the wire, and, while thus passing, the curved iron becomes a strong magnet. By connecting the two ends of the bent iron with a bar of similar soft iron, it will support many pounds weight. If, while in this condition, one of the wires is removed from the battery, the cross bar falls, and with it its weights. The curved iron returns instantly to its original state. It is unmagnetized. Complete the circuit, as at first, and in an instant it is again a magnet. Break the circuit, and it ceases to be a magnet. If the battery is placed 100, or 1,000, or 10,000 feet from the magnet, yet, when the one is connected with the other by intervening wires, the effect upon the magnet is the same—making it a magnet when the circuit is complete, and *vice versa* when it is broken. In this way, power is produced at a point of considerable distance from the generating agent, and wholly at the command of the operator at the battery to make or destroy the power produced, with the utmost possible rapidity.

Fig.3



The above figure represents the most simple form of the electro-magnet, with its appropriate machinery for telegraphic purposes. A represents a side view of the bent iron bar, surrounded with its coils of copper wire, standing upon a platform D. V being an upright arm secured to D, to which the magnet, or soft iron, is permanently fastened by means of the bolt B B B passing between the prongs of the curved iron, and through the board V, and adjusting screw C. E is the projecting prong of the iron after it has passed through the coils—one only being seen. The other prong is directly behind E. G represents the end of the iron bar, or keeper, extending back so far as to cover both the projecting ends of the horseshoe-formed magnet. This iron bar, or keeper, is fastened to the lever H H, which is delicately adjusted so as to rise and fall by a pivot at I. K represents a steel spring over the lever H H, and passes through a loop-hole L, formed from a brass wire; the lower part of the brass wire being secured to the lever H H by means of a screw at M. O is a hardened steel

point, similar to those used by manifold letter writers, and is also connected with the lever H H, and directly over the centre of the metallic roller T, in which a slight groove is made, to correspond with the point of O. R represents the standard in which the axis of the roller T freely revolves, and is a part of D. The line S represents the paper, in form of a riband, passing from its coil between the roller and the point of O. N and P are the two extremities of the wire upon the magnet A. Every part is now described; and, from what has preceded the description, bearing in mind the effect of the battery when in action upon the soft iron, by forming a complete circuit with the wires N and P, the mode of writing by the instrument may be easily comprehended by what follows. Complete the circuit, and instantly the cross bar G approaches the ends of the *magnet* E, until they meet in the direction of arrow W. Break the circuit, and G is carried up in the direction of arrow X, by means of the spring K. If to the roller T clock-work is attached, to give it a uniform movement upon its axis, the paper S will move with the same uniform motion under the point O; then, by completing the circuit, the point O is brought down upon the paper, which is indented to such a degree as to make it perfectly apparent, and continues to mark it in that manner so long as the circuit is closed; but, upon breaking the circuit, the marking ceases, and the point O flies from the paper, which continues passing on. If the circuit is closed and broken with the utmost rapidity, then a succession of dots and spaces upon the paper appears. If the circuit is successively closed and broken with less rapidity, short lines and intervening short spaces are made. If closed for a longer time and broken in succession, then the marks become longer; so that dots, short lines, long lines, and short or long spaces, are made, according to the time the circuit is closed, and the rapidity with which the paper moves under the pen. An arbitrary arrangement of these dots, short and long spaces and lines, constitute the telegraphic alphabet; by means of which, intelligence to any extent is communicated. Thus one dot may represent A, two dots B, three dots C, one dot and a line D, &c. The paper to be imprinted is fixed upon a revolving cylinder, and records despatches day and night; and this without ink, as the impressions are easily read, even by the blind. The records of the night continue entered on the morning. The alphabet is easily learned.

Extracts from a letter addressed by Professor Morse to the Secretary of the Treasury, relative to the magnetic telegraph.

That which seemed to many chimerical at the time, is now completely realized. The most skeptical are convinced; and the daily and hourly operations of the telegraph, in transmitting information of any kind, are so publicly known, and the public feeling in regard to it so universally expressed, that I need here only give a few instances of its action, further to illustrate its character.

The facts in relation to the transmission of the proceedings of the Democratic Convention at Baltimore, in May last, are well known, and are alluded to in my report to the department, June 3, 1844. (House Doc. No. 270, 28th Cong., 1st sess.) Since the adjournment of Congress in June last, and during the summer and autumn, the telegraph has been in

constant readiness for operation, and there has been time to test many points in relation to it, which needed experience to settle.

For more, now, than *eight months*, the conductors for the telegraph, carried on elevated posts for forty miles, have remained undisturbed from the wantonness or evil disposition of any one. Not a single instance of the kind has occurred. In several instances, indeed, the communication has been interrupted by accidents, but then only for a very brief period.

One of these was by the great fire in Pratt street, Baltimore, which destroyed one of the posts, and consequently temporarily stopped the communication; but in two or three hours the damage was repaired, and the first notice of the accident, and all the particulars, were transmitted to Washington by the telegraph itself.

Another instance of interruption was occasioned by the felling of a tree, which accidentally fell across the wires, and at the same time across the railroad track—stopping the cars for a short time, and the telegraphic communication for two hours.

Excepting the time excluded by these, and two or three other similar accidental interruptions, and which, during seven months of its effective existence between the two cities, does not altogether amount to more than twenty-four hours, the telegraph has been either in operation, or prepared for operation, at any hour of the day or night, irrespective of the state of the weather.

It has transmitted intelligence of the greatest importance. During the troubles in Philadelphia the last summer, sealed despatches were sent by express from the mayor of Philadelphia to the President of the United States. On the arrival of the express at Baltimore, the purport of the despatches transpired; and while the express train was in preparation for Washington, the intelligence was sent to Washington by telegraph, accompanied by an order from the president of the railroad company to prevent the Washington burden train from leaving until the express should arrive. The order was given and complied with. The express had a clear track; and the President and the cabinet, being in council, had notice both of the fact that an express was on its way with important despatches to them, and also of the nature of those despatches; so that, when the express arrived, the answer was in readiness for the messenger.

In October, a deserter from the United States ship Pennsylvania, lying at Norfolk, who had also defrauded the purser of the ship of some $600 or $700, was supposed to have gone to Baltimore. The purser called at the telegraph office in Washington, stated his case, and wished to give notice in Baltimore, at the same time offering a reward for the apprehension of the culprit. The name, and description of the offender's person, with the offer of the reward, were sent to Baltimore, and in ten minutes the warrant was in the hands of the officers of justice for his arrest; and, in half an hour from the time that the purser preferred his request at Washington, it was announced from Baltimore by the telegraph, "The deserter is arrested; he is in jail. What shall be done with him?"

To show the variety of the operations of the telegraph, a game of drafts and several games of chess have been played between the cities of Baltimore and Washington, with the same ease as if the players were seated at the same table. To illustrate the independence of the telegraph of the weather and time of day, I would state that, during the severe storm of the

5th of December, when the night was intensely dark, the rain descending in torrents, and the wind blowing a gale, it seemed more than ordinarily mysterious to see a company around a table in a warm retired chamber on such a night in Washington, playing a game of chess with another company similarly situated in Baltimore—the darkness, the rain, and the wind, being no impediment to instantaneous communication.

In regard to the quantity of intelligence which may be sent in a given time, it is perfectly safe to say that thirty characters can be transmitted in a minute by a single instrument; and, as these characters are conventional signs, they may mean either *numbers*, *letters*, *words*, or *sentences*.

As an illustration of this point, I will state that nearly a whole column (more than seven-eighths) in the Baltimore Patriot was transmitted in thirty minutes—faster than the reporter in Baltimore could transcribe.

This fact bears upon the ability of producing a revenue from the telegraph; and I would suggest the propriety of permission being granted by Congress to the department to adjust a tariff of charges on intelligence sent by telegraph, at such a rate of postage as shall at least return to the treasury the interest of the capital expended in the first construction and the after maintenance of the telegraph.

* * * * * * * * *

In the absence of experience, the expense necessary to construct and to maintain a system of electro-magnetic telegraphs was thought to be so great as to present a formidable, if not an insurmountable, obstacle to its adoption. But the experiment already made for forty miles has shown that the electro-magnetic telegraph is far from being expensive either in its first construction or after maintenance, especially when its vast superiority over the old system is taken into consideration.

To make this more clear, I give an abstract both of the expenses and capacities of the ordinary visual telegraphs in some of the European countries.

In England, the semiphore telegraph established between London and Portsmouth (a distance of seventy-two miles) is maintained by the British Government at an average expense of £3,405, or $15,118 per annum. From a return (vol. 30, 1843, accounts and papers of House of Commons) of the number of days during which the telegraph was *not available* on account of the weather during a period of three years, it appears that there were in that time 323 days in which it was useless, or nearly *one year out of three!* But by a return made to the admiralty of the number of hours in the day appointed for working the telegraph, it appears that the hours appointed for the year are—from the 1st of October to the 28th of February, from 10 o'clock a. m., to 3 p. m.—5 hours; from the 1st of March to the 30th of September, from 10 o'clock a. m., to 5 p. m.—7 hours.

Average number of hours per day in the most favorable weather, 6 hours!

Deducting one year from the three for unavailable days, the average time per day for the three years would be but 4 hours. So that for the use of their telegraph for seventy-two miles, and for only 4 hours in the day, the British Government expend $15,118 per annum.

The French system of telegraphs is more extensive and perfect than that of any other nation. It consists at present of five great lines extending from the capital to the extreme cities of the kingdom, to wit:

The Calais line, from Paris to Calais - - - -	152 miles.
The Strasbourg line, from Paris to Strasbourg - - -	255 "
The Brest line, from Paris to Brest - - - -	325 "

The Toulon line, from Paris to Toulon - - -	317	miles.
The Bayonne line, from Paris to Bayonne - - -	425	"

—making a total of 1,474 miles of telegraphic intercourse. These telegraphs are maintained by the French Government at an annual expense of over 1,000,000 of francs, or $202,000.

The whole extent, then, of the French lines of telegraph, is 1,474 miles, with 519 stations; and (if the estimate for six stations, at an average cost of 4,400 francs, is a criterion for the rest) erected at a cost of at least $880 each—making a total of $456,720.

The electro-magnetic telegraph, at the rate proposed in the bill, (to wit, $461 per mile, and which it should be remembered will construct not *one* line only, but *six*,) could be constructed the same distance for $619,514—not one-third more than the cost of the French telegraphs. Even supposing each line to be only as efficient as the French telegraphs, still there would be six times the facilities for not one-third more cost. But when it is considered that the French telegraph, like the English, is unavailable the greater part of the time, the advantages in favor of the magnetic telegraph become more obvious.

An important difference between the two systems is, that the foreign telegraphs are all a burden upon the treasury of their respective countries; while the magnetic telegraph proposes, and is alone capable of sustaining itself and producing a revenue.

Another difference in the two systems is, that the stations in the foreign telegraphs must be within sight of each other: a fact which bears essentially on the cost of maintenance. The French telegraph requires, for the distance of 1,474 miles, no less than 519 stations—averaging *one for about every three miles.* The number of stations of the magnetic telegraph, on the contrary, is optional. The two stations (one only at Baltimore and one at Washington) show that they may be at least 40 miles apart; and there is no reason to doubt, from experiments I have made, that 100 miles, or even 500 miles, would give the same results. In the maintenance, therefore, of stations, the magnetic telegraph would require but 15 stations, (assuming that 100 miles is the *utmost limit* of transmission between two stations, which is not probable;) while the French requires 519 for the same distance.

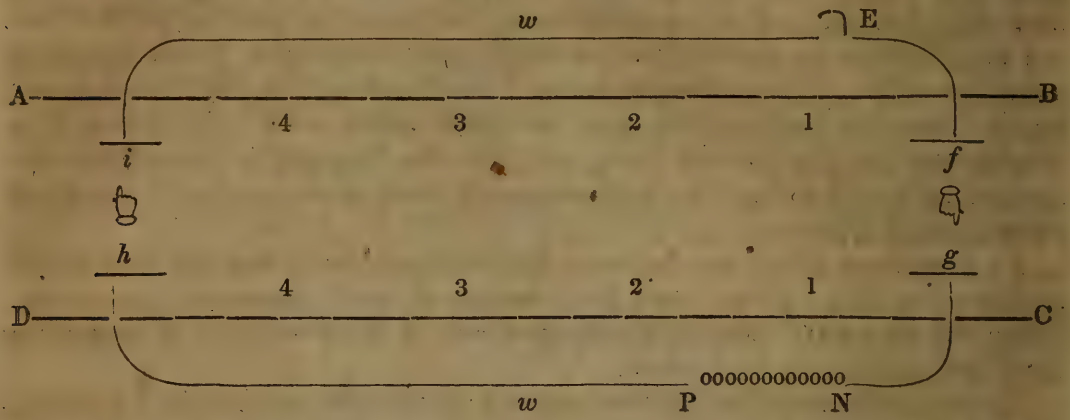
When to this are added the facts, that the magnetic telegraph is at *all times available,* at *every hour of the day or night, irrespective of weather;* that, in comparison with the visual telegraphs, it communicates *more than a hundred fold* the quantity of intelligence in the same time; that it is originally constructed at a *less cost, (all things considered;)* that it is *maintained for less;* and that it is capable, by a rate of charges for transmitting intelligence, not only of defraying all its expenses, but, if desired, of producing a revenue—I may be permitted to hope that, when these great advantages are fully understood, my system will receive that attention from the Government which its intrinsic public importance demands.

* * * * * * * * *

In the autumn of 1842, at the request of the American Institute, I undertook to give to the public in New York a demonstration of the practicability of my telegraph, by connecting Governor's island with Castle Garden—a distance of a mile; and for this purpose, I laid my wires properly insulated beneath the water. I had scarcely begun to operate, and had received but two or three characters, when my intentions were frustrated by the accidental destruction of a part of my conductors by a vessel, which

drew them up on her anchor and cut them off. In the moments of mortification, in a sleepless night, I devised a plan for avoiding such an accident in future, by so arranging my wires along the banks of the river as to cause the water itself to conduct the electricity across.

The experiment, however, was deferred till I arrived at Washington; and on December 16th, 1842, I tested my arrangement across the canal, and with success. The simple fact was then ascertained, that electricity could be made to cross a river without other conductors than the water itself; but it was not until the last autumn that I had the leisure to make a series of experiments to ascertain the law of its passage. The following diagram will serve to explain the experiment:



A, B, C, D, are the banks of the river; N, P, are the battery; E is the electro-magnet; *w*, *w*, are the wires along the banks, connecting with copper plates, *f*, *g*, *h*, *i*, which are placed in the water. When this arrangement is complete, the electricity generated by the battery passes from the positive pole P to the plate *h*, across the river, through the water, to plate *i*, and thence, around the coil of the magnet E, to plate *f*; across the river again to plate *g*, and thence to the other pole of the battery, N. The numbers 1, 2, 3, 4, indicate the distance along the bank measured by the number of times of the distance across the river,

The distance across the canal is 80 feet; on August 24th, the following were the results of the experiment:

No. of the experiment.	No. of cups in battery.	Length of conductors, *w*, *w*,	Degrees of motion of galvanometer.	Size of the copper plates, *f*, *g*, *h*, *i*.
1	14	400	32 & 24	5 by 2½ feet.
2	14	400	13½ & 4½	16 by 13 inch.
3	14	400	1 & 1	6 by 5 inch.
4	7	400	24 & 13	5 by 2½ feet.
5	7	300	29 & 21	5 by 2½ feet.
6	7	200	21½ & 15	5 by 2½ feet.

Showing that electricity crosses the river, and *in quantity in proportion to the size of the plates in the water.* The *distance of the plates on the same side* of the river *from each other* also affects the result. Having ascertained the general fact, I was desirous of discovering the best practical distance at which to place my copper plates; and, not having the leisure

myself, I requested my friend, Professor Gale, to make the experiments for me. * * * * * *

As the result of these experiments, it would seem that there may be situations in which the arrangements I have made for passing electricity across the rivers may be useful, although experience alone can determine whether lofty spars, on which the wires may be suspended, erected in the rivers, may not be deemed the most practical. The experiments made were but for a short distance; in which, however, the principle was fully proved to be correct.

It has been applied, under the direction of my able assistants, Messrs. Vail and Rogers, across the Susquehannah river, at Havre-de-Grace, with complete success—a distance of nearly a mile.

I have as yet said nothing on the telegraph as a mighty aid to national defence. Its importance in this respect is so obvious, that I need not dilate. The importance generally, to the Government and to the country, of a *perfect* telegraphic system, can scarcely be estimated by the short distance already established between Baltimore and Washington; but when all that transpires of public interest at New Orleans, at St. Louis, at Pittsburg, at Cincinnati, at Buffalo, at Utica, at Albany, at Portland, at Portsmouth, at Boston, at New York, at Philadelphia, at Baltimore, at Washington, at Norfolk, at Richmond, at Charleston, at Savannah, and at all desired intermediate points, shall be *simultaneously* known in each and all these places together—when all the agents of the Government in every part of the country are in instantaneous communication with headquarters—when the several departments can at once learn the actual existing condition of their remotest agencies, and transmit at the moment their necessary orders to meet any exigency—then will some estimate be formed both of the powers and advantages of the magnetic telegraph.

K.

During the past season, I have erected three tenements of unburnt brick in Washington city, and also one on Grand prairie, in the State of Indiana. The settlers on the prairies have expressed great satisfaction at this new experiment there. The house is cheap and convenient; a plan of which is annexed:

Fig. 1.

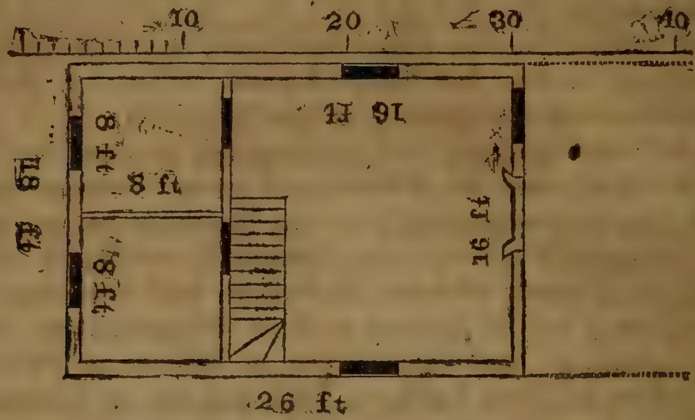


Fig. 2.

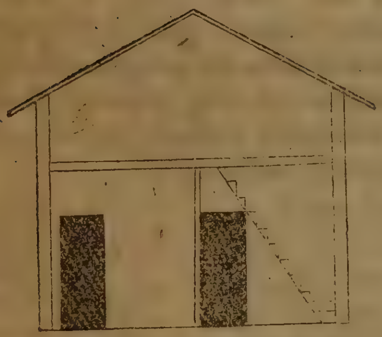


Fig. 3.

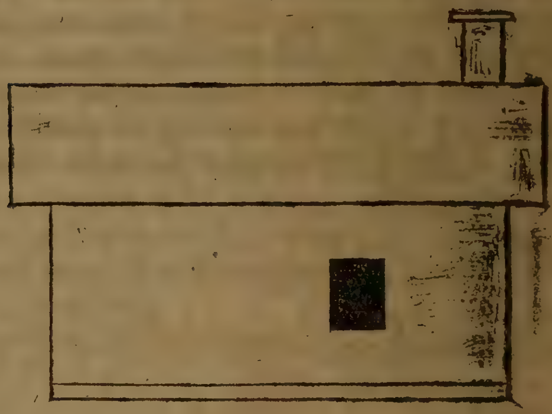


Fig. 4.

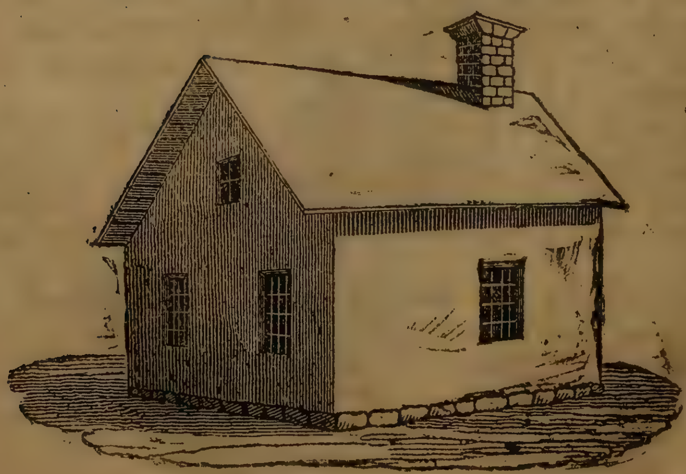


Fig 5.

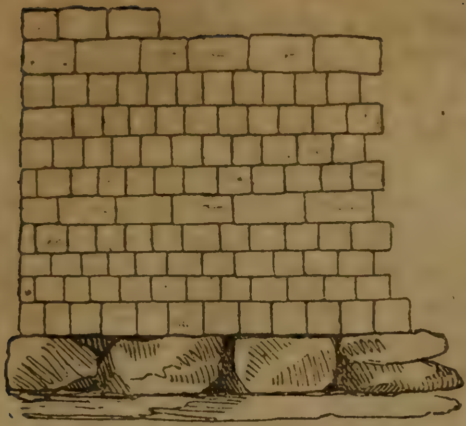


Fig. 1. Ground plan; the dotted line shows in which direction the building should be extended.

Fig. 2. Cross section.

Fig. 3. Side view.

Fig. 4. Perspective view.

Fig. 5. Shows the manner of laying the unburnt bricks and the foundation.

It is twenty-eight feet by eighteen, making a room of sixteen feet square, and two bed rooms eight feet square on the first floor. One chimney only is required; and the whole is so arranged that an additional room can be built without another flue. The house has but a single door; and this is so located that it will lead into the additional room, should one be built; a stairway is made into the upper story (see fig. 2) by extending the outer walls three or four feet above the joists, which rest on the brick. The upper room will admit of a division, making a lodging room over the bed rooms; or what may be better, and is adopted in my house, making a tier of berths resembling those in steamboats, on both sides—lighted and ventilated by a window in the end of the building. This upper room will accommodate very conveniently twenty lodgers, with separate beds. Ticks of osnaburgs, one and a quarter yard wide, filled with corn husks, well hackled after the butt end is cut off, laid on narrow ash or other supple boards, with a "comfortable" made of cotton, will secure easy and economical beds, and afford sufficient warmth for ordinary weather. The window frames are made of plank, of the thickness of the walls; the panes being 8 by 10 inches; cost from three to five cents per light. Five windows are needed for the whole house.

Many persons have been deterred from erecting unburnt brick houses, fearing the clay was not suitable. On this point, I would remark that almost all kinds of clay will answer; and if a cellar is needed, this must be built of stone. The following directions will enable any one to complete a building:

Plan of cheap cottages.—Select a suitable spot of ground, as near the place of building as practicable, and let a circle ten feet or more be described. Let the loam be removed, and the clay dug up one foot thick; or, if clay is not found on the spot, let it be carted in to that depth. Any ordinary clay will answer. Tread this clay with cattle, and add some straw cut six or eight inches long—using two common bundles to one hundred brick. After the clay is tempered by working it, the material is duly

prepared for the brick. A mould is then formed of plank, of the size of the brick desired. In England they are usually made eighteen inches long, one foot wide, and nine inches thick. I have found the most convenient size to be one foot long, six inches wide, and six inches thick. The mould should have a bottom, not air tight, since mortar will not fall when a vacuum is produced. The clay is then spread in the moulds in the same manner that brick moulds are ordinarily filled. A wire or piece of iron hoop will answer very well for striking off the top. One man will mould about as fast as another can carry away—two moulds being used by him. The bricks are placed upon the level ground, where they are suffered to dry for two days, turning them edgewise the second day; and then packed in a pile, protected from the rain, and left ten or twelve days to dry; during which time the foundation of the building can be prepared. If a cellar is desired, this must be formed of stone or brick, two feet above the surface of the ground.

For cheap buildings on the prairies, where stones are scarce, wooden sills, twelve or fourteen inches wide, may be laid on piles or stone. This will form a good superstructure.

In all cases, however, before commencing the walls for the first story, it is very desirable, as in walls of brick, *to lay a single course of slate;* this will intercept the dampness so often arising in the walls of brick houses. The wall is laid by placing the brick in lengthwise; thus making the wall one foot thick. Ordinary clay, such as is used for clay mortar, will suffice for laying up the brick; though a weak mortar of sand and line, where these articles are cheap, is recommended, as affording more adhesive material for the plaster. A mortar composed of three parts clay, two parts ashes, and one part sand, is very good; and this, when lime is not plenty, answers for plastering the inside. For ceiling, however, where there is walking over head, lime plaster should be used. The walls may safely be carried up one, two, or three stories; the division walls may be six inches thick, just the width of the brick. The door and window frames being inserted as the wall proceeds, the building is soon raised. The roof may be shingles or thatch. In either case, *it should project over the sides of the house, and also over the ends, at least two feet, to guard the wall from vertical rains.* The exterior wall is plastered with good lime mortar, mixed with cattle's hair or hog's bristles, (short ones;) and then, with a second coat, pebble-dashed. The inside is plastered without dashing. The floors may be laid with oak boards, slit, five or six inches wide, and laid down without jointing or planing, if they are rubbed over with a rough stone after the rooms are finished. Doors of a cheap and neat appearance may be made by taking two boards of the length or width of the doors; placing them vertically, they will fill the space. Put a wide batten on the bottom, and a narrow one on the top, with strips on the sides and a strip in the middle.

This door will be a batten door, presenting two long panels on one side, and a smooth surface on the other. If a porch or verandah is wanted, it may be made with cedar posts placed in the ground, with shingle or thatched roof.

Houses built in this way are dry and warm in winter, and cool in summer, and furnish no retreat for vermin.

They can be made by common laborers in a very short time, (a little carpenter's work excepted,) and with a small outlay for materials, exclusive of floors, windows, doors, and roof.

The question will naturally arise, will the walls stand against the rain and frost? I answer, they have stood well in Europe, South America, and Canada. Whoever has noticed the rapid absorption of water by a brick that has been burned will not wonder why brick walls are damp. Burning them makes the brick porous, while the unburnt brick is less absorbent; but it is not proposed to present the unburnt brick to the weather. Whoever has erected a building with merchantable brick will at once perceive the large number of soft and yellow brick partially burned that it contains, brick that would soon yield to the mouldering influence of frost and storm. Such brick are however placed within, beyond the reach of rain, and always kept dry. A good cabin is made by a single room twenty feet square. A better one may be erected eighteen feet wide and twenty-six feet long, cutting off eight feet on one end, for two small rooms eight feet square. How easy could a settler erect such a cabin on the Western prairies, where clay is usually found about fifteen inches below the surface, and where stone and lime are often both very cheap. The article of brick for chimneys is found to be quite an item of expense in wood houses. In these mud houses no bricks are needed, except for the tops of the chimneys, the oven, and casting for the fireplace; though this last might be well dispensed with, and a cement to put round the chimneys, or to fill any other cracks, is easily made, as before mentioned, by a mixture of one part of sand, two of ashes, and three of clay. This soon hardens, and will resist the weather. Boiled linseed oil may be added, to make the composition harder.

There have been numerous attempts to improve the appearance of buildings by washes; the great objection is the liability of these applications to wash off. The following recipes are given with much confidence—one for wood, and the other for brick or stone work. The superiority of this wash depends upon white vitriol, sometimes called sulphate of zinc, which is a powerful mordant to harden and fix the paint.

For brick or stone.—One barrel of stone lime, (fresh burnt the best,) slake it, and then add two barrels of hydraulic cement or water lime, stir them together until about the thickness of paint suitable to be laid on with a brush; then add twelve pounds of white vitriol, (sulphate of zinc,) stir the same for an hour, or until thoroughly mixed; let it remain twenty-four or thirty hours, and it is then fit for use. When you commence using it, take for every four gallons one quart of fine dry sand, and stir them together; put it on the wall with a large paint brush; if too thick, add a little water.

This mixture produces a pale yellow; after which, (when dry,) to produce a pure white, go over the same with whitewash, as follows:

1 bushel of lime, with 1 pound of sulphate of zinc.

For wood work—

1 bushel of lime;
1 pound of white vitriol, (sulphate of zinc;)
1 quart of salt;
1 peck of white sand.

I do not suppose the sand important for wood work.

Sulphate of zinc can be formed by taking one part sulphuric acid, four parts water, and adding as much zinc as it will take up.

Another recipe is used in Washington, which looks remarkably well, viz: For a barrel of wash, slake six quarts of stone lime, add four bushels of hydraulic lime, and one pint and a half of salt. It dries quick, so that

you may soon add another coat; two coats look very well. This substance adheres to the stone.

There is one great advantage in these washes, besides preserving the brick and wood—the hydraulic cement does much to exclude moisture.

No one will regret the trifling expense, when he sees the improvements in his buildings and fences by these applications.

The following plan of a chimney cap for insuring a draught, and preventing the wind from blowing down the stack, is well worth public attention. It is represented in the accompanying drawing. Figure 1 being a perspective view of a part of the stack, with the cap thereon; and figure 2 a top view, and consists of four planes, *c c c c*, placed at the top of the stack *b*, and one on each side of the flue *a*, and inclining downwards therefrom, at an angle of about 45 degrees; the junctions of the planes *c* being provided with wings *d d d d*.

A current of wind impinging on one or two of the planes *c*, is deflected in an upward direction by the inclination of the plane or planes, and its velocity gradually increased in passing from the base to the top of the plane, by means of the wings, which narrow the space through which the current has to pass. This gives great force to the current in passing over the top of the flue in an upward direction, and carries with it downward currents, which otherwise might blow down the stack.

Fig. 1.

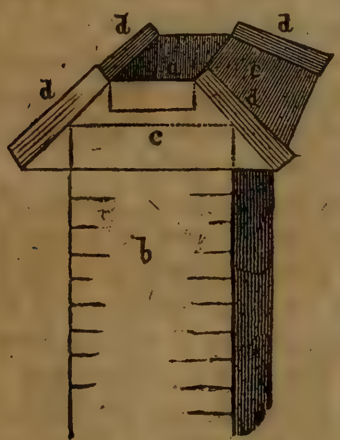
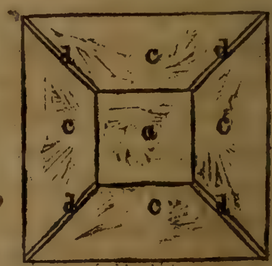


Fig. 2.



L.

Improvements made on the plan suggested in a former report for enclosing farms, especially the prairies, induces me to comply with the request of numerous correspondents, to add something on the subject in the present report. The United States have a deep interest in this matter, since they own so many millions of acres of fine soil, well adapted to field culture, if it could be fenced.

Fig. 1.

Fig. 4. Fig. 2. Fig. 3.

Fig. 5.

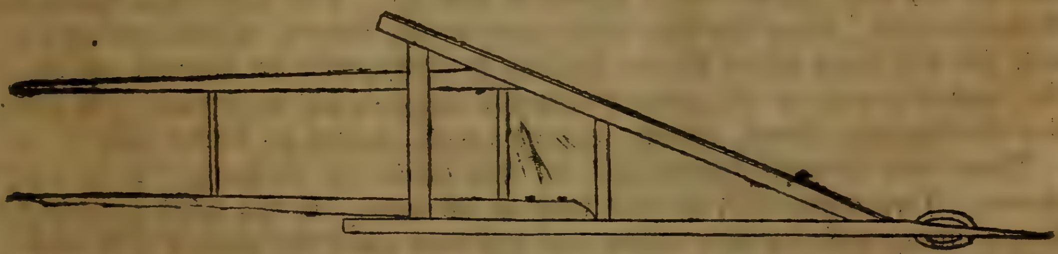


Fig. 6.

A

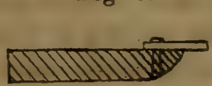


Fig. 1. Fence, with trees.
Fig. 2. Section of the ditch and embankment.
Fig. 3. Auger, with cutters.
Fig. 4. View of the holes bored.
Fig. 5. Bottom view of the plough.
Fig. 6. Section of the mould-board. A. A strip of iron.

The prejudice against ditches and embankments is yielding to experience. Sod banks or earth banks, if laid with too acute angles, will assuredly be affected in northern climates by the frost and storms, while a gradual slope with a good broad base will turf over and stand well. Those who are skeptical may find how flourishing the grass is on the declivity of hills sufficiently steep for the sides of a ditch. Experience leaves no doubt in my own mind on this subject. I am happy, however, to be confirmed in my opinion by a letter from Mr. Samuel Renkin, an intelligent farmer, who lives on the Shawnee prairie, in the State of Indiana, and who has made several miles of fence by ditching as now proposed. He says "there can be no doubt about the matter; the ditches do not wash down, but remain firm."

These ditches are made by simply uniting two planks at an angle of 21 or 22 degrees, as exhibited in figure 5. One improvement consists in having the land side (which goes in the furrow) project in front about 2 feet, in order to keep the ditcher steady. The mould board must be beveled, (the bevel being on the inner side;) if the plank is shod with iron, it will do better; also, if a strip of boiler iron is placed upon the outside of the mould-board, extending below it 1½ or 2 inches, it will work it to more advantage. The ditchers can be made of such materials as are at hand; two planks will answer. On the land side might be a stick of timber 3 by 8 or 10 inches. The angle being given, the ditches may be made to suit the purpose of the farmer. If a wide or high embankment is needed, the whole frame must be longer; the computation is easily made. Considering the ditch a triangle, the base will give the width of the bank, measuring from top to bottom—in other words, *the side*. If a mould-board of 12 feet will make a slope of the ditch 5 feet, an extension or diminution will change the power of the machine accordingly. If this ditcher is wanted for casting the dirt from the watercourse on the sides of a turnpike into the centre of the road, the mould board must be extended; consequently, the land side, which should always be a little the longest, is run to brace the mould-board; otherwise, the pressure of dirt against the end of the board would have a tendency to throw out the point in front.

It will be recollected that a common plough precedes the ditcher, and loosens the dirt, the whole of which is cast up. The operation needs no demonstration, since the land side runs in the furrow, which confines it; and the dirt, then taken by the ditcher in front, will be shoved up on to the embankment, in all cases where the angle is not so obtuse as to push the dirt directly ahead, which, in such a case, makes an entire failure.

There are several advantages in this mode of ditching. It is very cheap. Two teams will do the work of 50 men. If the ditch is only 18 inches deep, and the dirt taken out and laid upon the side, it will make, with the embankment, 3 feet; this, with 3 or 4 rails, is a good protection against cattle. For a fence, the saving is very great, as must be obvious. Four panels of Virginia fence, of 8 rails, when stakes and riders are used, will equal 10 rails to the panel; and 4 panels of this kind of fence are equal in distance to 3 panels of posts and rails—such is the sinuosity of the former. The rails for the posts need not be more than half the thickness.

The post-and-rail fence will require for 3 panels (4 rails to a panel) 12 rails, the Virginia fence 40; but since the rails for posts are thinner by one-half, although a little wider, it might be estimated that 9 rails are, with the im-

proved ditcher, equal to 40 as commonly laid in a Virginia fence. This is certainly a great saving where timber is scarce or cartage expensive. There is another advantage in the embankment—it saves digging post holes. If a plough is run on the line of fence in the beginning of the work, to make an excavation of 8 inches, the posts can be put into this, and, by placing a little dirt around it, it will remain firm. The dirt is then cast against it on both sides, (see fig. 2;) and when the embankment is completed, the post is imbedded in the earth 2 feet 2 inches. When posts are apt to rise by freshets, a transverse anchor may be driven through the post, which, being also imbedded, will retain the post more firmly—indeed, hold it fast, unless the bank gives way.

Fig. 4 shows how the posts are bored with an auger. This can be done by hand or by horse power. If the auger is 2½ inches, two holes will give a mortise of 5 by 2½ inches. Two men with an auger moved by horse power will bore enough in two days for one mile of fence, which requires 150 posts. The rails can also be sharpened with a circular saw, with great rapidity, at any angle required.

The ditch will drain wet land, or serve as a conductor for water to be confined in an artificial pond, when springs or brooks are not convenient.

One other recommendation is given, viz: to plant trees on the embankment near each post, to serve as shade, but more especially living posts, by the time the first posts decay. This is easily accomplished, by cutting limbs of cotton wood or sycamore (sometimes called button wood) into pieces about 2 feet long. These forced into the ground (a hole being first made by an iron, when necessary) 14 inches, will sprout up at once, and grow surprisingly. The wood of the past year's growth is preferable; and as cattle do not browse on sycamore wood, that is first recommended. By these means, what is now called prairie is soon surrounded by a most beautiful border, alike ornamental and useful.

While speaking on this subject, it may not be amiss to mention a preservative of timber inserted in the ground. The correspondence subjoined is respectfully commended to the perusal of those who feel interested in making enclosures against stock. The Shakers have practised salting their posts for many years. The experiment costs but little, and is confidently recommended.

—

Office of the Syracuse and Utica R. R. Co.,
Syracuse, January 2, 1845.

Mr. Rogers, the postmaster here, handed me your letter of the 17th ult., inquiring as to the use of salt in preserving timber from decay. I enclose you a copy of an article from the Cultivator, and also a copy of the writer's answer to my letter.

I am fully convinced that salt may be put into green timber, and so plugged up as to exclude moisture, and that it will preserve it for a long time. I think the length of time depends very much upon the care with which it is done. The small posts or stakes driven under the salt vats are considered as practically indestructible. Those that have been driven twenty years are sound. The whole business proceeds upon the assumption

that they will not decay. For aught we can see, they will endure for fifty years, or as long as they are thus used.

Yours, very respectfully,
JOHN WILKINSON.

Hon. H. L. Ellsworth,
Commissioner of Patents.

—

To preserve fence posts.

Poland, Herkimer County, N. Y.,
January 10, 1838.

Dear Sir: If you think the following is worth a notice in your valuable paper, you will be at liberty to publish it. The subscriber believes it may be useful to many of your readers.

In the spring of 1822, I set some sawed hemlock fence posts—one-half of them I salted, boring a hole with an auger, commencing a little above the surface of the ground, boring downward, and nearly through the post; then nearly filled the hole with salt, and plugged the whole to exclude the air and water. In the spring of 1830 the posts not salted were all rotted off; on removing them, there was not found a particle of sound wood below the surface of the ground. The salted posts are all now standing; and, to appearance, may stand years longer.

ABEL STILLMAN.

Mr. J. Buel.

—

Poland, *June* 30, 1843.

Dear Sir: Those salted fence posts you inquire about have decayed, and are removed. The first one replaced was in 1841, and the last in 1843. It might be proper to say that those posts were not more than four inches square. The salting was after they were set in the ground, and with only a single application of dry salt—and that, too, near the surface. It is best to apply the salt with water, whilst the posts are in a horizontal position; and keep them supplied some time before setting, as it is more convenient, and the salt penetrates the wood both ways the better.

Since the publication of my article in the Cultivator, I have heard of many instances where salt has been successfully used in preserving timber.

Your obedient servant,
ABEL STILLMAN.

Mr. J. Wilkinson.

—

We subjoin here, also, some remarks on the catalpa tree, which we take from an agricultural journal:

THE CATALPA—TIMBER FOR POSTS.

I never see a catalpa tree, that it does not immediately recall to my mind a fact stated by the late Gen. W. H. Harrison, in an address before the Ham-

ilton County Agricultural Society of Ohio, in 1831—that the catalpa is more lasting than either the locust or mulberry for fence and gate posts. Many portions of our country, new as it is, owing to the heedless waste and profligate use of every kind of timber, together with the utter neglect every where of any measures for reproduction, are already nearly without the necessary supply for common fencing. Indeed, there are some places where fence timber cannot be obtained, except by importation from distant places. As long ago as in 1820, the writer of this travelled through several counties in the Middle States, where nothing but boundary fences were thought of, and the public roads were crossed on the line between every two farms, by gates, which the traveller was obliged to open and close in passing. These gates were permitted by law, owing to the deficiency of timber for fencing the fields bordering on the roads. It is believed the same state of things still exists in that part of the country. Now, in a country like this, such a want of timber ought not to exist. Every owner of land on which there is a scarcity of timber should plant the several kinds of seeds, and take care of the young plants till they can take care of themselves, or permit spontaneous growths to grow, and thus secure the necessary supply of timber. But to the catalpa. In the address above mentioned, General Harrison said: "The wood of the catalpa affords, perhaps, a more lasting material than either that of the locust or mulberry; is of a very quick growth, and easily cultivated. Its ability to resist decay has been sufficiently tested in the neighborhood of Vincennes, both under ground and in contact with it. Over the little stream of the Desha, five miles from Vincennes, one of these trees had fallen before any emigration had taken place from any of the States to that place. It was certainly lying there in the year 1785, when a colony of Virginians from the south branch of the Potomac emigrated to that place, and for many years served as a foot bridge over the stream. I was informed by a gentleman of undoubted veracity, that it was only partially decayed a few weeks since, (that is, in the spring of 1831.) The same gentleman (Dr. Hiram Dickson) informed me that a bar post which was made by his father, and put in the ground at a little stockade work, which was erected in the year 1770, and which has been taken up and removed to his own farm, by his brother-in-law, Major Andrew Powell, is still sound, and answers the purposes for which it was originally intended." The late Colonel Philip Tabb, of Gloucester county, Virginia, one of the best farmers in that State, also long used the catalpa for gate posts, and considered them certainly as lasting for that purpose as any timber he had ever tried. Now, the catalpa can be grown from seed as easily as Indian corn; the seed can be obtained in great abundance, and I know of no tree that grows so rapidly; I have frequently seen plants come up from the seed in the spring, and attain a height of four or five feet the same season, and in three seasons they often grow twelve to fifteen feet in height. In good rich ground, I have no doubt they would grow six feet each season. If planted three or four feet apart for the first three years, they will grow as straight as reed poles. The fourth season they may be set out at proper distances for the formation of timber. Throughout the Middle, Western, and Southern States, the catalpa is perfectly hardy; I presume it is not so in the Northern and Eastern States. But there is a sufficient inducement in the former for the cultivation of it. On the prairies of the West it would be an invaluable acquisition, the soil and climate being well adapted to its rapid growth; and I am sure there are

few subjects to which the attention of our Western friends can be called, of more importance than this. It is well known that the destructive borer is rapidly destroying all the locust timber of our country, and a timely and equally valuable substitute may be found in the catalpa, in the extensive region indicated. So far as my observation extends, no insect whatever attacks it, either in the wood or the leaf. It is also pretty well known that chestnut requires a peculiar soil, and does not generally thrive well except on "chestnut ridges." It cannot be expected that the growth of this tree will be much extended. The white and red mulberry, it is true, thrive well every where; but they are nothing like the catalpa for facility and rapidity of growth; nor are they as lasting, if the opinion of General Harrison be correct. The writer of this is acquainted with one fact in relation to the white mulberry, that shows its qualities as ship timber. The frame timbers of the oldest steamboat now in the Chesapeake bay (the Maryland) are of white mulberry. There was a large plantation of white mulberry trees near Annapolis, planted, it is said, by the French refugees. The owner of the plantation, many years ago, cut down most of the trees, and they were used in building the steamboat Maryland. This boat, I should suppose, is twenty-five years old, and I understand her timbers are still sound.

G. B. SMITH.

M.

Letter of I. W. P. Lewis, Esq., civil engineer, upon wooden railroads.

Boston, *December* 29, 1844.

Dear Sir: I have received your communication of the 17th instant, and with great pleasure reply to your request for information on the subject of wooden railroads. Every one, at the present day, can see for himself the great advantage this country has derived from its system of railroads; and I can conceive that such structures as you propose, even though built in the roughest manner, would prove highly useful in many localities of the South and West, where the construction of roads of iron must long be deferred, for want of the necessary funds to carry out such undertakings. The wooden railroads used in England are, so far as I know, of very limited extent, and only applied as expedients, to save labor in the construction of large masses of buildings, in timber and dock yards, and other places where material of bulk and weight is to be moved over limited distances. These roads are commonly laid down with longitudinal sills of three-inch plank, kept parallel to each other by tie rods of light round iron passing through the substance of the plank. On the sills are bolted riband rails of hard oak, three inches square; and, as there is no fastening between each pair of sills, the sections of road thus formed can be taken up and shifted from one part of the premises to another. The carriages used upon these wooden rails have wheels with wooden tires, and running upon the end of the grain instead of the surface thereof, as do common cart wheels with iron tires.

I have sketched what appears to me the most simple form in which a wooden track could be laid down, and append the same hereto, with a modification of the wheel I saw in England. In the prairies, no practical objections to the construction of these temporary railroads would seem to exist, where timber is abundant, and the surface of the country nearly level; but, on very uneven ground, cut up by watercourses and ravines, abrupt elevations, &c., no form of railroad but the best can be used with either economy or advantage, even by a wealthy community. For the kind of road you desire, I should recommend the following: To lay down sleepers of 12 inches, round and rough timber, 7 feet long—notched 6 inches deep to receive the rails, and laid parallel, 5 feet apart from centres. Rails may be made of the best oak trees, whose trunks are as nearly straight as may be, and having slabs taken off, leaving two plane surfaces at right angles; and being notched and halved on to the sleepers, and then treenailed to the same, 5 feet apart. The tree rails could be spliced together with a joint, similar to the one shown in the annexed sketch.

The road way, or horse path, could be filled in with soil to a level with the tops of the sleepers—such would be the rough superstructure. Your grading would be a matter to judge on the spot; but the level of the rails, with regard to each other, should be as perfect as possible; and the angles of the tree rails should be rounded off, to save wear of the wheels. Gulleys and ravines would be easier crossed by rough trestle bridges than by any attempt at filling up with either timber or soil.

Fig. 1.

Fig. 3.

Fig. 4.

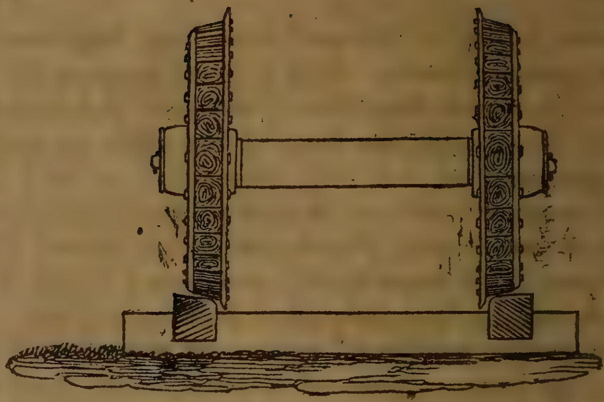


Fig. 2.

Fig. 1. Edge view of a pair of wheels.
Fig. 2. Side elevation of rail.
Fig. 3. Outside elevation of a wheel.
Fig. 4. Section of a wheel, showing arrangement of spokes and tire pieces.

The wheels shown in the sketch are entirely of wood, excepting the iron bolts which retain the several parts in their places. The inner surface and flange is formed of 2-inch plank—the outer surface of the same. The tire or felloes are of 4-inch oak, seasoned; wedge shape, with their outer ends forming the periphery of the wheel. A screw bolt of half inch iron must pass through each of these pieces, and the outer and inner faces also. When all the parts are arranged, (the spokes and hub being the same as those of a common cart wheel,) the screw bolts are firmly set, and the wheel is finished. I think, if the bearing surface of the tree rail were slightly beveled inwards, and the periphery of the wheels made to correspond, the carriage would more readily keep in the direct line of the road. I fear the few hasty remarks here thrown together, in answer to your inquiries, will prove of but little value; but they may possibly afford a hint to those better able to discuss the subject.

I remain, dear sir, with great consideration and respect, your obedient servant,

I. W. P. LEWIS.

Hon. H. L. Ellsworth,
Commissioner of Patents.

The following account of the conversion of wood into iron is interesting in connexion with this subject of railroads. We take it from the New York Farmer and Mechanic:

Conversion of wood into iron.—The conversion of wood into iron and stone, for railroad purposes, is exciting much interest in England. If the experiment bears the test of thorough trial, it will add immensely to the facility of constructing railroads. We hope the engineers, and those concerned in the building of railroads, will not delay in testing the value of this new discovery. The following extract of a letter of Professor Wright, dated London, June 18, 1844, and published in the Boston Chronicle of July 10, will show how the matter is regarded by intelligent men in England:

"A good deal is said, lately, about wood; and a patent has been taken out for converting it into iron—I should rather say into stone, by means of iron. This *metalized* (or rather fossilized) wood has been used in constructing the terminus of the Dover railway, and it really seems to have both the properties of stone and iron. Rails of it laid down at Vauxhall, for experiment, endured a travel equal to that of a year on the most thronged railway, without any perceptible wear; not even the saw marks of the timber being removed. It is supposed that timber thus prepared will not be subject to rot or decay of any kind.

"This, time will test. If this proves true, the invention will be of immense importance to the United States, where timber is yet plentier, and iron scarcer, than here. The process of preparing timber is simply this: The pieces, after having been fitted by the carpenter or joiner for their places, are introduced into an immense iron cylinder, which is then exhausted by an air pump. A solution of the sulphate of iron is then injected, which immediately enters into the exhausted pores of the wood. The wood is then withdrawn, and again placed in a similar vacuum, in a solution of muriate of lime, which, coming into contact with the sulphate of iron within the wood, decomposes it, and forms an insoluble sulphate of lime, or gypsum, within the wood; and the muriate of iron, the other new compound, goes about its business. So the wood becomes thoroughly impregnated with stone as hard as a rock, and is yet as tough as it was before. The expense of preparing 2,000 sleepers, enough for a mile of railway, is said not to exceed $400. Some of the greatest engineers have expressed their confidence in the invention, and the process is employed on many of the Government works. What an invention for our Mississippi valley! Railways built of light porous wood—the more porous the better, probably—may, for less than a thousand dollars per mile, be converted into roads nearly, if not quite, as durable as iron!"

F.

Report of C. M. Keller, Examiner, &c.

PATENT OFFICE, *January* 25, 1845.

SIR: In conformity with your wishes, I have the honor to submit the following report on the progress of inventions during the past year.

The classes of inventions intrusted to my charge, as examiner, are—

1st. Metallurgy, and manufacture of metals.
2d. Manufacture of fibrous and textile substances.
3d. Steam and gas engines.
4th. Navigation and marine implements.
5th. Civil engineering and architecture.
6th. Land conveyance.
7th. All kinds of mills for grinding grain, &c.
8th. Machinery for working lumber.
9th. Fire arms and implements of war.
10th. Miscellaneous.

In the report which I had the honor of submitting to your consideration last year, I gave a hasty sketch of the progress of inventions in the above classes up to that time, commencing with the infancy of the mechanic arts in the United States; and, although very hasty, it was sufficient to show the rapid strides with which we have reached an early and distinguished maturity.

In this report, as in the preceding, I shall not strictly confine myself to the inventions of the United States, but introduce such of the inventions of Europe, which have come to my notice, as I may deem worthy of public attention, either in their immediate applicability to our industry, or as containing the germs of future usefulness; for it often occurs that ideas which, in themselves, possess no practical usefulness, suggest and lead to the most important and useful inventions.

1.—METALLURGY, AND MANUFACTURE OF METALS.

At the time the gold mines of the South were first worked, ingenuity was stimulated to improve the processes and apparatus employed in the separation of the metal from the accompanying impurities, and many patents were obtained about that period. But the want of success in the working of many of these mines checked this stimulus; and within the past year not one invention made in this country, and but one introduced from abroad, has been patented; and as this appears to be important, I deem it advisable to point out its main features.

Heretofore, in separating gold from the impurities, by the process of washing, it has been subjected to only one current of water, either vertical or horizontal—the object being to carry away the impurities that are of less specific gravity than the metal, and leave it behind; but the process in question subjects it to the combined action of two currents of water—one vertical, and the other horizontal; the former carrying the impurities above the level of the metallic particles, and the latter washing them away, by which the process is greatly expedited. The apparatus for applying this process consists of a series of sieves separated by partitions, and surrounded by a casing with a valve opening upwards, and placed at one end of the series. The materials to be washed and separated are dropped into the first sieve of the series from the hopper above, adapted to

the delivery in given quantities, and the sieves then receive a vertical reciprocating movement in a water tank. On the descent of the sieves, the water passes through the meshes of the sieves and the valve; the former producing the vertical current, loosening the lighter and impure particles, and carrying them above the partitions; and the latter, by its volume, the horizontal current, washing all that has been carried above the partitions to the next sieve, and so on to the end of the series, to catch the particles of gold that may have been carried up with the impurities.

Nothing of importance has passed under my notice during the past year, originating either in Europe or in this country, connected with that branch of metallurgy devoted to the obtaining of metals, except in iron; the working of which becomes of more importance every day, from the great wants of society, and the rivalship of capital, industry, and ingenuity, invested and devoted to this highly important branch of the arts.

In my last report I alluded to the important results brought about by the use of the gases escaping from smelting and other furnaces, as a fuel, by the admixture of these with atmospheric air. A modification of this important invention was patented in the latter part of the year 1842; and as it has since been reduced to successful practice, I deem it important to the iron interests to call public attention to it. The improvement is applicable to all reverberatory furnaces, and is intended to remove defects which have been known to exist ever since the *rationale* of the process was understood. When a fresh charge of coal is put on the grate, a large portion of the heat becomes latent, in gasefying the coal, preparatory to its ignition; which gases, thus evolved, are mostly combustible, and, not being supplied with oxygen, escape from the chimney in an unconsumed state—thus wasting great quantities of fuel; and when the gases have been distilled, and the coal is in an incandescent state on the bars, the blast supplies too much oxygen, which, coming in contact with the iron, oxidizes and wastes it. To remove these difficulties, the fire chamber of reverberatory furnaces is made of such depth as to have a very thick stratum of coal upon the grate, which fuel is converted into combustible gases by a blast, or current of air, forced into a closed ash pit under the grate; and in combining with this gas-generating chamber and furnace an arrangement of blow-pipes, or other convenient apparatus, through which heated atmospheric air is to be forced, by means of any ordinary blowing machine, into the said gases, for the purpose of effecting their combustion in passing to the chamber of the furnace containing the iron where the heat is to be applied. In this way, all the gases, instead of escaping as heretofore, are consumed in the immediate neighborhood of the iron where the heat is required, and the oxygen of the atmospheric air is not permitted to act injuriously upon the iron whilst heating it.

The following extract from the Transactions of the Society of Arts may be worthy of the attention of our ironmasters:

"*Improvements in the manufacture of iron.—Patented by Thomas W. Booker, Esq., of Melin Griffith, near Cardiff.*

"The method usually, now and heretofore, adopted in the manufacture of bar iron, (where the dangerous, and, as the author thinks, reprehensible practice of puddling the crude or raw pig iron, without the intervention of the refining process, is not adopted,) is as follows: The pig iron is

thrown upon what is called the milling finery, or run into the finery in a fluid state from the smelting or blast furnace; and, after undergoing the process of refining, it is run out into cakes or moulds, and suffered to get cold; it is then broken up into lumps of a convenient size, and thrown into the puddling reverberatory furnace, which is usually constructed with one door, and at which only one man can work at a time. The author's improved method is detailed in his specification, plan, and model, and the effect is this: a saving of fifty per cent. in fuel, and nearly 50 per cent. in metal, an immense saving of labor, and a greatly increased product of work in the puddling furnace: the usual product of a puddling furnace being from fourteen to eighteen tons in a week, while the author's will as easily produce from forty to fifty tons in a week. The author thus combines the process of refining with puddling; and, to show the importance of preserving, and the hazard of dispensing with the refining process, he subjoins the results of an analysis by M. Berthier, of three samples of cinder or scoria, in one of which the remarkable fact of the presence of phosphoric acid shows how important this operation is to the purification of the iron.

	Silica.	Protoxide of iron.	Alumina.	Phosphoric acid.
A Staffordshire sample -	0.276	0 612	0 040	0.072
A South Wales sample -	0.368	0.610	0.015	none.
Do do -	0.424	0.520	0.033	none.

"The object of Mr. Booker's invention is to simplify and accelerate the conversion of cast iron from its crude state into malleable or wrought iron; for which purpose, the refinery furnace is adapted to the various qualities or descriptions of cast or pig iron which it may be necessary to use, by surrounding or enclosing the earth with blocks of cast iron, into and through which water is allowed to flow out, or not, as may be expedient; and, as is well understood in making refinery furnaces, the blast of air being introduced through one, two, or more apertures or tuyeres, as usual.

"The refining is connected with the reverberatory or puddling furnace, which is constructed of the requisite form and dimensions. The bottom of the body of the furnace, and the grate bars, and binding plates and bars, are formed of iron; the other parts of the furnace are constructed with fire bricks, sandstone, or fire clay, as is well understood. In the neck, or near the flue of the reverberatory furnace, is an aperture through which the iron, when it has become decarburetted or refined in the refinery, is introduced, or run in a fluid state, direct from the refining hearth into the puddling or reverberatory furnace. On each side of which reverberatory furnace a door is constructed; the door in the one side being immediately opposite to the door in the other; through which two doors the workmen perform the process of puddling, in the ordinary way in which puddling is done when working only with one door, which is the general practice.

"*As respects the refining.*—Having thrown up the fuel, and having, by the application of fire and blast, produced the necessary heat, a charge of 9 cwt., or thereabouts, of pig or cast iron, of the description generally used for forge purposes, is thrown on and melted down, and decarburetted or refined in the ordinary way; and when the refining process is completed, the whole charge of metal is run off in a fluid state direct into the reverberatory or puddling furnace, previously prepared to receive it, by

having been already heated to a proper degree of temperature, and by the bottom, sides, bridge, and opening to the flue, being protected in the ordinary way, by the workmen having previously thrown in a sufficient quantity of limestone and iron cinder. The metal having been introduced into the reverberatory or puddling furnace in a fluid state, the workmen raise, apply, and regulate, and vary the heat in the ordinary way, by feeding and moving the fire in the grate, and raising or lowering the damper on the top of the stack or flue, as circumstances require, and as is well understood; they at the same time stir and agitate the iron with bars and puddles, while the escape of the oxide of carbon, in a gaseous shape, takes place, and until the whole mass of iron agglutinates. The workmen then divide it into lumps or balls of a convenient size, and draw the charge from the furnace, passing the lumps to the squeezer, hammer, or rolling cylinders, or such other contrivance or machinery as is used for forging or compressing the iron.

"During the process of refining the iron, by the application of heat and blast, in the open refining hearth, a considerable quantity of scoria or cinder is produced, which is tapped and run off as heretofore, as circumstances require. But it is to be observed that, during the process which the iron undergoes in the reverberatory or puddling furnace, the author does not find that any cinder need be generated or produced; and cinders and limestones are thrown in, as already described, for the protection of the various parts of the furnace exposed to the action or agitation of the fluid metal, but no cinder need be tapped or drawn off.

"*Mr. Aiken's opinion.*—The principal novelty in Mr. Booker's invention consists in placing the refinery and puddling furnace so near each other, that the refined iron may be run in a liquid state into the puddling furnace, instead of allowing it (as is usual) to cool and become solid when let out of the refinery, previous to its being transferred to the puddling furnace. The heat lost by the iron is thus saved, as well as the time required to bring the solid refined iron to a state of fusion. Both the refining and puddling are to be performed, according to Mr. Booker, in the usual way; it was therefore incumbent on him to show how it happens that, while the common process of puddling produces slag, his does not.

"Mr. Booker's statement, that by his process a saving of full 50 per cent. in fuel, and nearly 50 per cent. in metal, is effected, appears to be an enormous exaggeration; the saving in the former being only (as far as appears) the fuel required to melt the refined iron. In making iron of the best quality, 31.74 cwt. of pig iron give 26.45 refined, which is reduced to 23 in the puddling process; 8.74, therefore, is the loss which 31.74 pig suffers in becoming puddled iron. Half this loss (namely, 4.37) will represent 50 per cent. of saving; and this, added to 23, makes 27.37, which is 0.92 more than the entire quantity of refined iron.

"Berthier's analysis of two samples of scoriæ from South Wales, and one from Staffordshire, showing the presence of phosphoric acid in the former, and none in the latter, has no bearing on Mr. Booker's statement that, in the process of refining, the phosphoric acid is separated from the iron.

"If the quality of the iron produced by Mr. Booker's process is not worse than that of iron refined and puddled in the usual method, Mr. B.'s process deserves the approbation of the society. But I would recommend that Sir J. Guest, or some other practical ironmaster, should be consulted.

"In answer to a communication from the secretary, Mr. Booker writes:

"'I account for the production of slag in the common puddling furnace, and its non-production in mine, as follows: The common puddling furnace is so constructed, that the iron operated upon in it is exposed to a very rapid draught or current of air, which rushes in at the grate at the back of the furnace, and passes off through the body, and into the flue and stack at the head thereof. This draught is so great as to oxidize the iron, and transform a great portion of it into slag or scoria, during the process of puddling; which process, moreover, is effected so slowly, that the charge of iron, consisting of from $3\frac{1}{2}$ cwt. to $4\frac{1}{2}$ cwt., is exposed to the heat and draughts in the puddling furnace during the space of full an hour and a half.

"'My puddling furnace is so constructed, that the draught or current of air admitted at the grate is broken, and its oxidizing effects upon the surface of the iron while fluid, and upon the fibrous particles as they cohere, after the oxide of carbon has been expelled, are entirely neutralized. That portion, therefore, of the charge which, in the common puddling furnace, is converted into slag or cinder, in mine is not wasted or oxidized, but remains and is converted into pure malleable iron.

"'The saving of fuel is thus accounted for: In the common puddling furnace, not more than $4\frac{1}{2}$ cwt. is admitted at one time, and this in a solid cold state. In mine, double the quantity is admitted, and that in a melted and fluid state. It is obvious that the time, fuel, and labor necessary for melting the iron are saved, and that double the quantity of iron is converted from a cast into a malleable state within half the space of time.'"

The manufacture of malleable iron directly from the ore continues, and will continue, to attract the attention of the ironmaster, until all the difficulties to its economical application shall have been surmounted, and science and art shall be able to claim this as another triumph. Within the past year, a patent was granted having this important object in view; and, to satisfy the iron interests, I here insert the description of the process given by the patentee, without meaning to be understood as approving or disapproving the suggestions of the inventor; which, as I have not heard of the practical test, might prejudice the inventor or the public.

The patentee proposes to carry on his process in puddling furnaces so modified in form, by elevating the roof towards the chimney, as to avoid the reverberatory character, and thus prevent the flame from impinging on the ore, which (says the patentee) "converts the larger part of it into slag, instead of reducing it into malleable iron." The ores, instead of being mixed with fluxes, in the usual manner, which has always been considered indispensable, are to be employed alone, by mixing together, in due proportion, such ores as by their chemical composition are calculated to react upon each other when duly heated, and to bring the metal contained in each of them into the malleable state—such as oxides and carburets of iron; the oxygen of the former uniting with the carbon of the latter, will, in the judgment of the patentee, liberate the particles of iron, which, when brought to the proper degree of heat, are to be balled in the usual manner of puddling.

Such are the views of the inventor, as given in his specification; and, in introducing them, I do not wish to be understood as approving or disapproving them.

Another patent was granted to the same person, for an improvement in reverberatory furnaces, to be used in the process above stated, or for puddling; which consists in placing the fire grate below the furnace hearth or floor, that the heat may be applied below and above.

I have made strict inquiries, and have not been able to ascertain whether it has been put to the test of practical experiment, and shall therefore make no comments.

A modification of the stack of smelting furnaces has been suggested and patented, which consists in dividing the stack into two, three, or more compartments, by means of partitions extending from the top to a point a little above the entrance of the blast. Into one of these divisions the coal only is put, and the usual charge of ore, coal, &c., in the others; and that part of the hearth which is below the coal division is elevated above the other portion, that the coal may be kept up to the blast, and permit the melted metal to descend below it. The patentee sums up the operations and the advantages in the following words, viz: "The greatest part of the charge being put in the compartment next to the headstone, the metal will rest on the boshes, and will not come down faster than it is melted by the blast, the principal part of which comes in through the body of coal in the chamber, from the blow-pipe; the combustion being thereby rendered perfect before the blast reaches the metal, a great saving of fuel is effected, and a better quality of iron is produced. The damper over the coal chamber is kept down during the operation, and the gases are allowed to escape through the chambers on the opposite side of the partition. The fuel in the chamber rests on the hearth, and cannot fall much below the blast. A small blast can also be thrown in on the opposite side of the furnace to the main blast, which is regulated at pleasure."

A variety of simple and compound substances have heretofore been mixed with iron in the melted state, with the view of more effectually separating the impurities, and producing a more highly refined metal. As a modification of these processes, a patent has lately been granted for mixing with the melted iron, in the process of puddling, a compound of sulphur and a nitrate with borax, soda, or potash and alum, broken in small lumps, and introduced below the surface of the melted iron; the proportions to be varied, if the iron is intended for the manufacture of steel.

We have, within a few years past, been astounded at the development of science, and the new phases put upon many branches of the arts by the development of electrical science, and the application of this mysterious and powerful agent; and such have been the developments, that, when the results of some new application of it are made known, belief is staggered for a while, until evidence comes so quick and strong, that incredulity no longer finds a resting place, and wonder follows close upon its steps. Such are the thoughts suggested by the examination of a patent granted for the application of currents of electricity to iron and other metals when solidifying in the mould, and when smelting in the cupola. As this invention has excited much inquiry, and its usefulness is so easily tested, I have deemed it important to insert the description of the process in the language of the patentee, which is as follows, viz:

"The nature of my invention consists in the use and agency of electricity in the manufacture of iron, steel, and copper, and other metals—the object thereof being to facilitate the malleability and purity of the

metals under the process of manufacture, as hereafter particularly described. And, in order to enable others skilled in the manufacture of the said metals to practise my invention, I shall proceed to describe the process to be pursued; and, first, with reference to the manufacture of iron.

"My said invention consists in subjecting the iron whilst in a fluid state, and also whilst in the act of congealing or solidifying, to a current of electricity, which I cause to traverse as completely as possible throughout the entire metallic mass. In casting a bar or similar mass, I cause the current to traverse from end to end by conductors, properly placed for the purpose, and so arranged that, when the metal runs into the mould, it may be made to complete the circuit of the electric current; or I previously make such an arrangement, by means of a wire or wires, of iron or other metal, stretched in, or passing from end to end of the mould, so that the electric current may be, in the first instance, made to traverse the wire around or over which the fused iron is afterwards allowed to flow. There are other methods of performing this operation, and of making such arrangements as may admit of the melted iron, or the iron during its solidification, being traversed by or subjected to the influence of the electrical current. The following are instances of the mode in which I effect this in particular cases. If the castings are horizontal, I place at each end of the mould (which I suppose is to be made of sand, clay, or some similar bad conductor or non-conductor of electricity) a piece of clear wrought iron, or other proper conducting metal, which is called the pole or conductor; and I then connect each of these poles or conductors, by means of a copper or other wire, with the extremities of a galvanic apparatus, or voltaic pile, or electro-magnetic or other battery, of sufficient power for the purpose. I have found that eight pairs of plates, of about four by six inches, consisting of alternations of platinum and zinc, arranged in separate cells of nitric acid, and dilute sulphuric acid, so as to construct what is usually denominated Grove's voltaic battery or apparatus, to be convenient for my purpose, and sufficient for a ton of metal, though any of the other forms of the voltaic apparatus or battery, or any other source of an adequate electrical current—particularly that commonly known as 'Smee's,' and consisting of from 20 to 30 pairs of plates of the above size—may be employed with advantage. Having then connected the extremities of the battery with the respective poles or conductors, in such a way that when the melted iron is allowed to run into the mould, it may so complete the electrical circuit as to admit of the castings being traversed from end to end by the electrical current, I allow the cast metal to cool and set while in that condition; and, as soon as it has entirely set or solidified throughout, the connexions with the battery may be broken through. I think it is advantageous, particularly in casting ordnance, to continue the electric current for some time after the metal has entirely solidified. When the castings are vertical, a similar arrangement is made for the passage of the electric current through the metal; and this I effect by placing at the bottom, or sole of the mould, a plate or rod of iron, or other conducting substance, while a similar conductor is inserted into the upper end of the mould, in such a way that the electric circuit may be completed the moment that the mould is filled with the liquid metal.

"In applying electricity to iron in a smelting furnace, or cupola, I insert

one rod of wrought iron in or alongside of the top hole, until it comes into contact with the smelting metal; and another rod into the upper and posterior part of the hearth, or in at one of the tuyere holes or apertures, until it comes into contact with the surface of the metal—the outer ends of these two rods being placed, respectively, in connexion with the opposite poles of the electric battery, so as to complete the circuit; care being taken not to continue it so long as entirely to decarburate the iron, and bring it into a malleable state. In applying electricity to the iron in the puddling or balling furnace, I insert one rod, similar to the above, into one part of the fused metal; and I attach to one end of another iron rod an insulating handle of porcelain pottery, or other substance not conductive of electricity, and then fix to the end of that iron rod, close to the handle, the conducting wire from one pole of the voltaic battery; and the other fixed iron rod being connected with the other pole of the battery, I seize the insulating rod by the handle, and make its extremity traverse in contact with various points of the iron in its melted state, or during its transition into the solid state; thus making the electrical current pass through the metal in every possible direction.

"The part of my invention applicable to the manufacture of steel is as follows: The bars of wrought or other iron fit for the manufacture of steel are placed in the usual boxes and furnace; and, so far, I employ the same means and apparatus commonly called a converting furnace, and in common use. But, instead of imbedding the bars of iron for conversion in common charcoal, or in the carbonaceous substances in common use, I employ a mixture of charcoal, with the carbonaceous and other matters used by the sugar refiners, and through which their sirups have been filtered; these residues consisting chiefly of animal charcoal, derived from the combustion of bone and other animal or organic substances, and containing phosphate of lime. And I further add to this mixture a certain quantity of rosin, amounting to about one part of rosin to ten of the mixture. And I further imbue their carbonaceous substances, mixed and prepared as I have described, with a saturated solution of white arsenic in water.

"Having thus prepared the carbonaceous bed in which the bars of iron intended for conversion into steel are laid and enclosed, as in the modes usually adopted, I next make arrangements for transmitting a current of electricity through the bars, after they have been duly converted into blistered steel, and whilst they are still red hot; my object being to transmit such electrical current through each of the bars, together or successively, whilst cooling down in the furnace. This I effect by attaching an iron, copper, or other proper wire, to the ends of the bars, and bringing its extremities out of the furnace, so that, at the proper time, a connexion may be made between these wires and those forming the poles or conductors of a voltaic apparatus or pile; and in this way the electrical circuit is so completed, that the current of electricity may be made, as aforesaid, to traverse the bars for a longer or shorter time. I prefer commencing the transmission of the electricity when the bars have become blistered steel, and are red hot in the furnace, and continuing the transmission till they have so far cooled down as to be capable of retaining magnetism. Now, although I prefer, as a source of electricity, that form of galvanic or voltaic battery, or apparatus, known under the name of Grove's battery, any other adequate source of electricity may be resorted to.

"And although I have alluded to blistered steel only, and described

my process as applicable to it, I further claim its application to cast steel. And when thus applied to cast steel, the details of the process I prefer are similar to those which I have specified in regard to the transmission of electricity through cast iron; my object being the same in regard to the cast steel as to the cast iron—namely, to subject it to the influence of an electric current whilst in fusion, and in the act of setting, and, to a greater or less extent, during the period of its cooling down to common or atmospheric temperature.

"As regards the manufacture of copper and other metals, the electric current is to be applied under the process of manufacture, in the manner hereinbefore particularly described with reference to the manufacture of iron."

In the manufacture of steel, which has thus far made very little progress on this side the Atlantic, but little has been done by our countrymen; and I fear that the prevalent idea, current in England as well as this country—that the best qualities of steel can only be made from Swedish iron—tends in a great measure to retard enterprise, and consequently improvements in this branch of metallurgy. It is difficult to comprehend why a notion, unsustained by sound reason, should have attained so much prevalence as this. Science clearly indicates, that to obtain the best quality of steel requires iron in its purest state; and to obtain this latter, requires skill and experience—these being the only impediments to the manufacture of good steel; and possessed, as we are, of nearly every variety of iron, no good reason can be assigned why we should not successfully overcome this prejudice.

But one patent has been granted during the past year connected with the manufacture of steel; and I here insert the leading portion of the specification, that the views of the inventor may be combated, if founded in error, and lead to better suggestions; and, if good, that it may lead to a practical test of its merits:

"In the ordinary mode of constructing the converting furnace, the bars of iron, after being piled in the coffer or oven, in combination with the carbonaceous matter, to the proper height, are covered with a stratum of fine clay and sand, or some analogous substance, which has to be removed every time the oven is charged.

"My improvement in the structure consists in the using of a permanent roof of fire stone or fire brick, in place of the temporary covering heretofore employed. I also use a sliding shutter, which is placed in front of the furnace, so that it may be brought down as required for a purpose to be presently made known.

"My improvement in the manufacturing of the steel, after the process of cementation has been completed, consists in the taking of the bars first from the upper part of the convertory whilst they are at the highest temperature to which they are to be brought, and subjecting them immediately to the action of tilting, or of rolling, without the necessity of reheating. To do this, a part of the upper layer of bricks which enclose the converting oven is first removed, so as to enable me to draw out the upper bars; and as the bars are successively operated upon, the bricks are further removed, until the whole contents of the convertory have been tilted or rolled. As this process goes on, the sliding shutter is brought down, so as to enclose the part from which the bricks have been removed. By this procedure, several advantages are attained in the process of manufacturing

steel. Under that hitherto followed, the whole charge has been allowed to cool down before removing the steel from the convertory, and this necessarily resulted in great loss of time; the bars, after being removed, had to be reheated, in order to their being tilted or rolled. By this reheating time was consumed, and the steel actually injured; it being a well-established fact, that every time steel is highly heated, it is deteriorated. The steel manufactured by my improved process has proved to be very superior to that made from the same iron in the ordinary way; it has, in this particular, uniformly exceeded the anticipated benefit."

As the properties of mineral coals employed in the making of iron are known to exercise important, and often very injurious, effects on the products of the furnace and forge, the report of Professor Walter R. Johnson, of Philadelphia, of his experiments on the coals of the United States, made to the Secretary of the Navy, and published by order of Congress at the last session, will be a valuable contribution to the ironmaster, who, being acquainted with the ingredients of the fuel employed, can, by proper attention to chemical science, avoid or prevent many injurious consequences, which otherwise he would not only be unable to guard against, but be wholly at a loss to comprehend; for, in all operations in which chemical affinities and actions take part, the results of scientific investigations can alone be relied on. It is to be regretted that the same means have not been furnished by the Government for investigations in other branches equally important, and which require experiments and researches on a scale of magnitude wholly beyond the reach of individual enterprise; for, however important and beneficial the results of such inquiries may be to the whole country, there is no way in which the individual experimenter can secure to himself a sufficient portion of the results of his labors to obtain a reward for the time and expense; and therefore the Government alone can be looked to.

Manufactures of metals, and machinery connected therewith.—In the working of blacksmiths' forges, the accumulation of cinder is a matter of much inconvenience, particularly where large masses of iron are worked. The accumulation of cinder has frequently to be removed, which not only consumes much time, but disturbs the fire. To avoid this inconvenience, an improvement has been patented, which consists simply in making the hearth of the forge to slide up and down in a sink or well, so that at every fresh charge of coal the hearth descends a short distance with the cinder on it; and when the hearth reaches the bottom of the sink or well, the whole of the cinder is removed through a hole in the bottom, and the hearth is forced up to the top to recommence.

The steam forge hammer, to which attention was called in my last report, as applicable to the forging of large masses of iron, particularly in the conversion of cast into malleable iron, is said to be subject to an inconvenience in practice. The piston rod of the engine, to which the hammer is attached, and by which it is operated, by the repeated blows is said to upset; that is, in less technical language, becomes shorter and thicker—an effect well known to all workers in iron and other metals. This difficulty has led to some suggestions with the view to remedy the evil; and a patent has just been granted for working the hammer by means of two rollers, that receive motion from a steam engine, or other motive force, one of which has its bearings in permanent, and the other in movable boxes connected with a toggle-joint or other lever, so arranged as to force this roller

towards the other, and gripe a square rod on the hammer to lift, and then separate them to liberate it—the toggle joint lever being connected with the roller by means of a powerful spring; and the mechanism that operates the toggle so arranged as to enable the attendant to regulate the play of the hammer at his discretion, to strike a light or heavy blow, as the condition of the iron may require.

The forging of blacksmiths' anvils is an operation attended, as may well be imagined, with some difficulty, not only from their size, but principally from the peculiarity of the form. With a view to facilitate and cheapen the operation, an arrangement of dies and swages has been patented, which is ingenious, and appears to possess merit. Attempts have often been made to give the desired forms to anvils by swaging; but, in giving the form between the top and the stand, the face was always destroyed; and in restoring the face, the reverse effect was produced. To avoid this difficulty, the die which receives the horn, and gives one of the curves, extends up to form a rest, against which the face of the anvil rests, and which preserves it when the swage is brought down to give the required form. There are other minor improvements in the arrangements of the parts of the machinery, to facilitate the presentation of the anvil to the various swages and hammers employed in the series of operations.

For the riveting of boiler and other plates of iron which require hermetic joints, the employment of a machine operating in the manner of a punching machine, with the dies adapted to beading, has been resorted to in England extensively, and partially in this country, as I have taken occasion to state to you on a former occasion; and I perceive that this has been improved by working the punch or swaging die by means of a toggle-joint lever—the piston rod of a steam engine being jointed directly to the toggle, at the point of junction of the two arms, instead of a tappet wheel or cams, as heretofore; by which the connecting parts are greatly simplified, and much friction saved. The attendant can, as in the steam hammer, control the operation of the machine at discretion, by means of a lever that operates the valves.

In the manufacture of *butt hinges*, of cast or wrought iron, some improvements have been patented within the past year, which are worthy of notice, in view of the fact that this article, although apparently insignificant, is very extensively manufactured in this country. The improvements in making cast-iron butts relate entirely to the arrangement of the moulds to facilitate the moulding, and insure the accuracy of the work. And in the making of wrought-iron butts, the improvements relate to that part of the machinery employed in preparing the plates of metal for the machine that bends the knuckles, and for trimming the parts after being formed.

Manufacture of pins.—The machine for sticking pins in papers, to which your attention was called last year, although an important improvement in this branch of manufacturing industry, was very imperfect, from the circumstance that the operatives had to arrange the pins with the heads all in the same direction—the most troublesome part of the operation, from its excessive tediousness. But this difficulty has since been removed; and now, by a simple contrivance, the pins, from a mass put into the hopper, run down two inclined planes, placed at such a distance apart as to receive their shank, but not the head; and in this way, with the point down, they are delivered in the machine, which sticks them in the papers for market.

This is the only improvement, connected with this branch of manufactures, which has come to my notice in a manner that can be made public, although there are various improvements in progress. In the space of a few years, by the efforts of a few ingenious men, an article for which we were wholly dependent upon England is now entirely, or nearly so, produced at home.

Connected with the manufacture of *wood screws* and *nails*, no improvements of a distinctive character have been patented during the past year—except one for making wrought nails, the invention of an American citizen residing in England, and another for feeding or presenting the rods to nail-cutting machines; and these have not, to my knowledge, been reduced to practice. The former changes entirely the mode of operation which is pursued in machinery for this purpose, now, and for some years past, in successful practice. Instead of forming the nail from a rod in the direction of its length, as now practised, a plate is introduced, from which, at each operation, a piece is cut off, griped, and held against the face of the bed cutter, until a roller passes over it to give the required form to the nail, which is afterwards pointed and headed. The machine is more complex than those in operation; but may possess superior advantages, which I have not, however, been able to appreciate. And the latter is intended to effect the presentation of the rod to the action of the cutters, in a manner similar to that pursued when done by hand, and different from those heretofore employed for that purpose. As one end of the nail is thicker than the other, it becomes necessary to reverse or change the inclination of the rod at each time a nail is cut, to make the head end from opposite sides at each successive operation. By hand the former course is pursued, which prevents the action of the cutters from bending the rod; but by the machines heretofore employed or essayed for this purpose, the inclination only has been changed; and the object of the present improvement is to effect the presentation of the rod in the same manner as by hand, and thus prevent the tendency to bend the rod.

Locks.—Several patents have been granted during the past year for improvements in door locks and latches. The door locks are all on the well-known permutation or combination principle, and are contrived with a view of preventing the opening of the lock by picks, which can be effected with the best permutation locks when the bolt is so situated that pressure can be applied to force it back; the unavoidable elasticity of the metal of which they are made enabling a skilful picklock to move them in succession to that position which will permit the bolt to move back. The locks in question are arranged with a secondary impediment, or impediments, so connected with the main combination tumblers as to be moved by the latter when pressure is not applied to the bolt to force it back until after the tumblers have been brought to their proper position, but which are prevented from moving by the application of pressure to the bolt. And the improvement in latches has reference to the simplification of the moving parts, to render them cheaper and less liable to be deranged.

Tools.—Several patents have been granted for a variety of instruments or machines generally known under the appellation of *tools*. Several of them are for boring and drilling iron, and for filing saws by the turning of a crank. A bench vice has been made the subject of a patent, which presents an important and distinctive feature, and appears worthy the attention of artisans who use such tools or instruments. It consists in connecting the

movable jaw with the permanent one, by means of a universal joint; so that the movable jaw, instead of being always parallel with the permanent one, can take any angle, and thus adapt itself to the form of the article to be griped.

Lead pipes.—In the manufacture of lead pipes, it is alleged that, in forming the pipe from lead in the fluid state, it will adhere to the core which forms the inner part of the pipe; and as the making of pipes from lead in the heated, but solid or set state, has been patented, various efforts have been made to dispense with this, and to improve it. A patent has been granted lately for passing a current of steam, or other fluid, through the core, to keep its temperature below that of melted lead, and thus prevent it from adhering. This branch of manufactures is now extensively carried on, and will continue to increase, from the circumstance that lead pipes present so many facilities in manufacturing and domestic economy; and, therefore, every improvement or suggestion connected with it must command interest.

The great variety of purposes to which iron is applied, and the advantages which its use presents, every day enlarge the demand for it, and not a day passes without its being applied to some new purpose; but the great affinity which it has for oxygen, and therefore its tendency to corrode, retards very much its application to many important purposes, such as the construction of ships; and as the protection of it against the action of oxygen would remove this difficulty, science and ingenuity are making bold efforts to discover or devise means of coating the surface in such manner as to prevent galvanic action; and several patents have, within the past year, been granted, in this country and in Europe, for processes for coating iron in such manner, and with such substances, as to prevent corrosion.

2.—MANUFACTURE OF FIBROUS AND TEXTILE SUBSTANCES.

Preparation of fibres.—Cotton gin.—Patents have been granted for alleged improvements in cotton gins; one for a modification of the roller gin for long staple, which consists in so arranging three rollers, (one large and smooth, and the others small and fluted,) that the cotton passes in between the two small ones, and then between the upper small and the large one; by which the inventor alleges that the fibres are more effectually separated from the seeds and foreign matters, and delivered in a more perfect manner than by the other modes. And the others are for arrangements of extra ribs on the saw gin, to retain the fibres more effectually whilst the brushes act upon them and straighten them; and for new arrangements of brushes, &c., to insure a better action on the fibres, and a more perfect delivery of them.

It is by a series of apparently unimportant improvements like these, that this beautiful invention of Eli Whitney has been rendered one of the most perfect pieces of mechanism known to the arts.

Wool combing.—The machines for combing wool, admitted to be one of the most difficult operations connected with the preparation of fibres, continue to command the attention of the ingenious minds of our manufacturers, who are ever on the alert to improve the processes and mechanism connected with their pursuits, with the view of obtaining better or cheaper results. In one of the machines lately patented for this purpose,

combs are arranged on radial bars attached to the face of a disk wheel in such manner as to be parallel with the face of the disk, and at right angles with the radial bars from which they project; and these, in combing, act in conjunction with teeth or combs, radiating from the rim of another wheel, and also carry the fibres around, to receive the action of rotating brushes. And in another machine, the teeth on the main or carrying wheel project from the rim of a wheel in lines parallel with the shaft, as in machines previously known and used; and the teeth of the combs that act in connexion with these are made coarse at one end, and gradually finer towards the other, and the fine end is placed nearer to the carrying teeth on the wheel than the other; and the working combs have, in addition to their rotary, a movement towards and from the carrying teeth; and the wool is applied to the carrying teeth by means of feed rollers, that lash or lay it on.

I have not been able to ascertain whether these alleged improvements have been reduced to practice; the former is an American; and the latter an English invention, patented in this country.

In addition to these, a patent has been granted for an arrangement of toothed cylinders, &c., for the purpose of subjecting the fibres of wool to the action of teeth, for the purpose of loosening the fibres, and removing moats and burrs, and to currents of wind, for carrying off all impurities.

Carding.—Such was the rapid progress made a few years since in machinery for carding cotton and wool, that we now see but few attempts at improvement. One patent has, however, been granted, for a mode of cleaning the cards, which consists of a roller covered with long wire teeth, and so located as to act on the cards beyond the stripper, and which, entering between the teeth of the cards, cleanses out all that may remain between them. This cleaner is applicable to the stripper, as well as to the main card.

Another improvement has been proposed, and patented in England, which "consists in a peculiar adaptation of endless bands of wire cards to a carding engine, by means of which equal quantities of fibrous materials are taken from the main drum or cylinder of the carding engine, in a great number of distinct bands or strands of continuous slubbings or rovings. In effecting this object, no material alterations are made in the construction of the carding engines from those usually employed for carding fibrous materials, but only so far as regards the peculiar adaptation and arrangement of endless cord bands." For a full description and drawings, see London Journal of Arts and Sciences, volume 24, conjoined series, page 253.

In the same journal, volume 25 of the same series, page 124, will be found a description of a mode of making the backs of all kinds of cards, which, as a matter of economy, is worthy the attention of manufacturers. It "consists in forming the back of wire cards of those descriptions of leather called sheepskin, basil, and roan-basil, cemented to woven fabrics."

Preparing the fibres of hemp.—The impulse which has lately been given to the culture of this plant in the Western portion of our country has led to many attempts at improving machinery for breaking the woody part, and separating the fibres therefrom; but, unfortunately, most of those who have applied their minds to this subject had not in their possession the means of ascertaining what has been done on this subject before, both in Europe and this country; and the consequences have been

labor lost and hopes blasted; for by far the greater part of the applications for patents have been rejected for want of novelty, and those that have been granted are limited to mere improvements of principles long known. In view of this great waste of time, labor, and money, would it not be important to furnish that region of country with full information on this subject? The Patent Office, where all this information centres, by the contributions of inventors, and the foreign journals devoted to inventions, it appears to me would be the best place from which such a work should emanate.

Spinning.—In this branch of manufactures, but three patents have been granted during the past year—one of them for a modification of the well-known ring-groove spinner, by which the cost of construction is much reduced, and the carrier or flying hook is removed from the ring with great facility. Another is for a modification of the mode of giving the necessary motion to the bobbin for winding on, by placing the bobbin which runs on a dead spindle on a washer provided with arms that extend to the wings of the flyer, by which it is carried around; the friction between the washer and bobbin being sufficient to give to the bobbin the desired motion for winding. This improvement is considered by the patentee especially applicable to the making of roving, and all operations in the spinning department admitting of but a gentle pull. And the last is for an improvement well worth the consideration of manufacturers. It consists, in the words of the patentee, "in giving to the bobbins, flyers, and spindles, the required rotary and traversing motion, by causing the bobbins to rest on the peripheries of wheels, arranged on a horizontal traversing shaft or shafts." By means of this arrangement, bands are entirely dispensed with.

It appears, from the foreign journals, that several patents have been granted in Europe for alleged improvements in the various kinds of machinery for acting on fibrous substances after these leave the carding engine. Most of them are limited to modifications of the spindle, and its immediate connexion with the bobbin, and do not present characteristics sufficiently marked to require notice here. But one of the patents is for an apparatus placed over the mouth of the can, such as is used for the reception of slivers; which apparatus receives the sliver of cotton, or other fibrous materials, in the state it leaves the carding engine, a drawing frame, or a slubbing frame, and disposes it in a can, in coils; so that when such coiled sliver reaches from the bottom of the can to the apparatus, that part of the sliver which is subsequently passed out of the apparatus presses upon, and, by the aid of the apparatus, condenses the other coiled part in the can. By this invention, a sliver of cotton or other fibrous material may be disposed of in a can, or other suitable receptable, in coils, and condensed to any degree required, without elongating, crimping, or otherwise damaging it for the subsequent operations connected with spinning.

An apparatus has also been patented in England, combined with spinning machinery, by which the yarn can be sized or stiffened preparatory to being transferred to the warp beam of the loom, and also for dying yarns.

Silk.—In machinery connected with the preparation of silk, there is but one improvement to record for the past year; and this is equally applicable to other fibrous substances. It frequently happens, in reeling silk

and other fine fibres, that too much tension is given; and in removing the skein from the reel, the fibres are liable to break. To avoid these inconveniences, one arm of the reel is connected with the shaft by means of a spring slide, so as to yield under an undue tension of the fibres, and by means of which the arm can be forced in by the attendant, to free the skein preparatory to removing it.

Weaving looms.—This complicated and beautiful branch of mechanics continues to receive contributions from the ingenious manufacturer here and abroad; and although the chronicler of the progress of inventions cannot, year after year, note down striking improvements, such as were developed by the master minds of Jacquard and others, who gave to posterity the great and leading principles on which the art of weaving does still and most likely will continue to depend, yet this piece of mechanism continues to be improved, simplified, and adapted to the weaving of fabrics by automatic machinery, which it was supposed a few years since could only be effected by the delicate operations of the human hand.

The patents which have been granted are for modifications of those parts of the machinery by which the yarn is given out, and the cloth wound up as fast as the weaving is effected, and by which these operations are adapted to the constantly varying thickness of the filling yarn, or weft, and for arresting the loom when the shuttle fails to carry the weft through the warp—operations requiring a delicacy of mechanical sensibility (if I may be permitted to use the expression in reference to inert matter) which was but a few years back pronounced beyond the reach of possibility. Other improvements have also been patented for modes of shifting the shuttles in weaving fabrics, requiring changes of colors in the filling at given periods—such as plaid cloths, which, having of late become very fashionable, have stimulated the inventor to exertions in this line; for, after all, with inventors, as with other men, gain is the greatest of all incentives to action.

The instruments employed in looms for keeping the cloths distended widthwise, and called "temples" in technical language, have also received some contributions during the past year.

Knitting or stockenett looms.—It is only within a few years that attempts to make knitting looms to operate by power have been successful; and even at this time, the question of success, as one of manufacturing economy, has not yet been settled; and notwithstanding so many failures, many minds are still laboring at the problem.

Two patents have been granted for this purpose—one for an arrangement of the sinkers or looping jacks and needles, with the view of bringing the operative parts employed in the formation of the loops more directly within the reach of the attendant's eyes and hands, together with minor arrangements of the other parts; and the other for an entirely new arrangement of the mechanism around a central shaft, so that the machinery weaves or knits an entire circle without seam. The thread is carried continuously around, and the stitches or loops are formed one after another, in succession, around the entire circle. This invention exhibits much ingenuity; but whether it will prove scccessful in practice, is a question which experience alone will fully test, in an economical point of view, as there is no doubt of the operation of the machine.

The great desideratum in this class of machines has not yet been attained, and is surrounded by difficulties. Most of the articles formed by

knitting require to be shaped by widening and narrowing, as in knitting stockings by hand—an operation now performed by hand in all machines for this purpose; or, (as it has been practised in Europe,) the fabric is woven in the piece, and then cut of the required form, and sewed together; but, when made in this way, the articles sell at a very low price in the markets, because of their inferiority to those shaped in the loom. If this operation of shaping be performed by the hand, there will necessarily be very little saving in working the machinery by power, for the attendant must be there to shape the fabric; and, therefore, until this operation, which is by far the most difficult, be performed by automatic hands, power machinery will have very little the advantage of hand knitting looms.

The following is the description of a process patented in England for rendering cotton fabrics repellant to water, &c., viz:

"This invention is intended to be applied chiefly to fustian cloths, called 'beaverteens,' although it is also applicable to other cotton fabrics. It consists in rendering the fabrics repellant to water and mildew, and prevening any unpleasant smell, by steeping them in, or passing them through, the solutions hereafter described.

"As the general practice of dyers is to mix their solutions with reference to the weight of the cloth or other material to be immersed therein, and without regard to its length or width, the patentee describes his process upon this plan; the quantities mentioned being calculated for fabrics of which a piece sixty yards long, and twenty-seven inches wide, will weigh forty pounds.

"To prepare a solution in which the fabrics are to be immersed, the patentee proceeds in the following manner: Twenty pounds of calcined British gum are mixed with eight gallons of cold water, in a suitable vessel or vat, until fine and pasty; then ten pounds of palm or white soap are dissolved in eight gallons of boiling water, in another vessel; and this solution is added to the former, together with one pint of logwood liquor, and the whole is boiled up together; three pounds of rock alum, dissolved in one gallon of water, are then added; and the mixture, after boiling for a few moments, is ready for use. The cloth or fabric (having been previously prepared and dyed in the ordinary way) is steeped in, or passed through, the above mixture or solution, in the usual manner of stiffening and drying cotton fabrics.

"Sometimes the patentee uses two solutions in succession—one of which is formed by boiling six pounds of sulphate of zinc in nine gallons of water, and, when cold, drawing off the clear solution; the other is made by dissolving twenty pounds of calcined British gum in eight gallons of cold water, and ten pounds of palm or white soap in eight gallons of boiling water; then mixing these two solutions, and, after adding a quarter of an ounce of pearlash, bringing them up to a boiling heat. The cloth or fabric is first steeped in, or passed through, the zinc solution; and is immediately afterwards steeped in, or passed through, the other solution."

For the benefit of those who are engaged in making ornamental fabrics, I here insert the essential parts of the specification of a patent granted in England for coating cloths, leather, and other fabrics, with metal, by electricity, viz:

"The first part of this invention consists in coating with metal, by

electricity, various felted and other fabrics, such as cloth, linen, leather, paper, glass, earthenware, and similar non-conducting substances, by bringing the fabrics into contact with conducting surfaces.

"The patentee illustrates his invention by describing the methods which he adopts for coating metals with copper, but any other metal may be used. A plate of copper (which the patentee terms a die or matrix) is coated on one side with varnish, or other suitable non-conducting material, and the other side is rubbed over with plumbago, to prevent the adhesion of the metallic deposite. Upon that side of the plate which is covered over with plumbago, the cloth to be coated with metal is placed, and secured by cementing or otherwise; and the matrix is then immersed in a solution of sulphate of copper, and connected with the zinc pole of a galvanic battery; another plate of copper being then immersed in the solution, and connected with the copper pole of the battery, the deposition of metal upon the matrix commences. When the surface of the matrix is covered with a thin film of copper, the depositing begins to penetrate the interstices of the cloth, and, if the operation is continued sufficiently long, will appear in small globules at the opposite side. As soon as the required thickness of metal has been deposited, the matrix is removed from the solution, and the cloth separated therefrom. The surface of metallic coating will be either plain or ornamented, according as the surface of the matrix is prepared, whether plain, or ornamented with a raised or sunk pattern; and the metallic deposite may be afterwards gilt, plated, or otherwise improved in appearance.

"Instead of using the copper plate alone, as above mentioned, the patentee sometimes employs, as a matrix, a plate of copper together with a plate formed of an alloy of six parts lead to one of antimony; or, in lieu of this compound matrix, the copper plate may be used in connexion with gold, silver, or lead, in the state of foil."

Those who feel an interest in this process, and who may desire to make a test of it, will find a full description of the apparatus in the London Journal of Arts and Sciences for September, 1844, page 96.

Hats.—Several patents have been granted during the year for machinery employed in pressing hats and bonnets, and in forming leather hats. But as these are mere modifications of, or improvements on, methods known and in operation, and as these could not be made clear to the reader without drawings, I am under the necessity of passing them over, with the bare mention of the objects.

It is no doubt known to you that fur hats are generally made with common fur alone, or mixed with wool, for the body; and after the body has been formed, the finer quality of fur is put on the outside, and felted, or worked in As a substitute for this, it has been suggested (and the process patented) to make two separate and distinct hats—one of common fur or wool, or both mixed, to which the stiffening is applied; and the other very thin, and of fine fur, to be slipped on the other. I have seen a hat thus made, which had a very good appearance.

In closing this class, permit me to call your attention to a machine lately patented for making Tuscan braid; which, for ingenuity and beauty of mechanical arrangement, is worthy of the highest commendation. I regret that, from the necessary complexity of the mechanical arrangements, a description without drawings could not be made sufficiently clear. After the pieces of straw have been deposited in a box, the whole operation of

taking each separate piece, introducing, bending it over, trimming off the surplus, and transferring and retransferring the pincers or nippers by which the pieces are held, and the completed braid delivered, is carried on with the most beautiful regularity, without the hand of an attendant.

3.—STEAM AND GAS ENGINES.

Steam boilers, or generators and furnaces therefor.—The management of the furnace is a subject which has only been understood within a few years past; and, in fact, can scarcely be said to be fully understood even now, although science has shed much light upon it. True, much attention has been paid to this subject for a long time. Rules had been adopted for regulating the size of the fire, and grate furnaces, and the apertures between the grate bars, with the view of obtaining the best results; but, as the *rationale* of the process of combustion was not fully understood by those who formed and adopted those rules, it must be evident that many of them were founded in error, and therefore either good or bad, as chance might be pleased to order it. We may go back several years, and find suggestions on this subject, which indicate that correct views were entertained by some, who pointed out the proper remedies; but, unfortunately, they were not possessed of that bold energy and enthusiasm, approximating to a monomania, which alone will carry the inventor through the labyrinth of difficulties that seem to be placed in his pathway, to test, as it were, the sincerity of his belief in the truth of his creation; and hence these suggestions slumbered until practical men were led to a proper appreciation of the value and importance of science, and scientific men to look with more respect upon the real value of the experience of the practical man. This mutual recognition has led to the most important results in every branch of artistic industry, and in none with more success than the branch under consideration. Without a full and clear understanding of the constituents of the fuel to be used, and of atmospheric air, and the various conditions under which these bodies are decomposed, and their constituent gases evolved and combined, to give out the greatest amount of heat, together with the circumstances under which they generate the greatest amount of steam, no essential progress can be made; but, with a clear understanding of these, the inventor and engineer can contrive the apparatus to meet the demands by a process of inductive reasoning, leading to accurate results; and he can pronounce upon the merits of the contrivance, without the necessity of a resort to lengthy and expensive experiments.

The patents lately granted in this branch indicate the spread of science; for we find that the contrivances are made with a view to meet the demands pointed out by philosophic investigations; they are for modes of regulating the admission of atmospheric air, to commingle and combine with the gases evolved from the coals on the grate, and to evolve the greatest amount of caloric in such parts of the flues as will heat the largest surface; for regulating the admission of the air to the coals on the grate bars, and to regulate the quantity to be supplied to the demands of the coals; for either more or less than the exact sum is injurious. In one of these, the air to be supplied to the gases evolved from the coals is introduced through a regulating register at the end of the return flue, and in a line with it, with the view of commingling thoroughly, (an important requisite,) and of aiding the draught at the same time. In another, (pat-

ented in England,) the atmospheric air is introduced through the meshes of wire gauze in the door of the furnace, and above the fuel, and at the bridge, so as to introduce it in the smallest imaginable jets—the greatest subdivision being considered an important consideration. The introduction of the air above the fuel is injurious, as it forms a current which prevents the flame from impinging on the boiler. By another plan, patented here, it is proposed to close up the fire chamber all round, except an aperture in front and below the fire grate, and to force in a blast of air above and below the fire grate, and thus force out the products of combustion by the pressure of the blast; and, to insure a still greater pressure within the fire chamber, and also with the view to prevent the escape of smoke and sparks, the end of the upper flue dips in water, so that the products of combustion have to pass through the water.

This branch of the arts has received a valuable contribution in the report of Professor Walter R. Johnson of his experiments on the coals of the United States, which is replete with valuable information to the engineer; for, by a reference to the data, the engineer will be enabled to adapt the condition of his furnace to the kind of coal which he is obliged to use; or, if free to select the quality, he can adapt the kind of coal to the furnace, so as to obtain the most economical results. Strict attention to his work cannot be too, strongly urged upon those who have the management of furnaces: they will find in it data for what has heretofore rested upon mere conjecture.

The improvements in *boilers* and *generators* during the last year have been very limited. One of them is for an arrangement of small horizontal cylinders on the same plane, and opening into a cylinder of larger capacity, into which the supply of water is forced, and to which the steam pipe, safety valve, &c., are attached. For the purpose of regulating the heat, there is a piston, working in a small cylinder open to the steam chamber, which, when the elastic force of the steam passes a certain range, is forced up, and, by an appropriate connexion, closes the damper in the chimney. So far, this arrangement is old; but it is combined with an apparatus which resets it after the elastic force has descended below the proper range. This apparatus consists of a valved cup, attached to a lever and a reservoir; so that, on the rise of the lever, a valve in the reservoir is opened, and water flows into the valved cup, which gives to the lever the preponderance, and overcomes the friction of the piston, and forces it down again; the water, in like manner, being discharged from the cup when it reaches the bottom.

A patent has also been granted for an arrangement of concentric tubes, forming three concentric departments. The waste steam, passing through the middle one, heats the supply water on its passage through another of these departments to the boiler, and also the air for the blast, which passes through the third, on its way to the grate.

As the height and condition of water in steam boilers are of the first importance as a question of safety, any reasonable suggestion on this subject must be interesting to the public at large, and particularly so to those who construct and manage steam engines. The employment of a separate or auxiliary engine to work the feed pumps, and so connected with a float within the boiler as to start this engine when the water reaches the low-water line, was patented some years since; and within the past year improvements have been made on this plan, and patented, which consist in so arranging the valves as to insure the starting of the engine when steam

is admitted by the sinking of the float, without reference to the position of the piston in the cylinder; and also for the arrangement of balance valves in connexion with the float, so that the pressure of the steam shall not act to prevent the float from descending with the level of the water.

Another method of regulating the height of water consists of a float placed in a vessel communicating with the boiler, above and below the water line, and also with the supply pipe. A valve, fitting a valve seat in the supply pipe, is attached to the lower stem of the float; so that, by this arrangement, the water forced into this vessel by every stroke of the pump runs out with the return stroke of the pump when the water is sufficiently high to keep the float up, and therefore the valve open; but, when the water is not high enough to sustain the float and valve, the water forced in (the valve opening upwards, for that purpose) cannot run out; for, on the return stroke of the pump, the valve closes, and prevents the water from running out; and, to prevent the water forced into the vessel containing the float at every stroke of the pump from abstracting heat from the water in the boiler, there is another valve on the stem of the float, which, when the float is sufficiently high, closes the pipe leading from this vessel to the lower part of the boiler; so that the supply water only enters the boiler when the supply is required.

A very simple device has been introduced in England for indicating the density of brine in the boilers of marine steam engines, which I deem worthy of attention. This device is the invention of, and has been reduced to practice by, Mr. J. Scott Russell, an engineer of distinction in England. The following is an extract of the description given of it by the inventor:

"I have lately employed, in some large ships destined for transatlantic voyages, a species of brine gauge, or index of saturation, which is found to possess every advantage, and which I therefore desire to communicate to the public through this society. The drawings sent are such as may enable any engineer to construct them for himself. The details of the arrangement of the apparatus were made under the direction of Mr. James Laurie, formerly one of my assistants; and he also has obliged me by writing out the annexed description of the operation of using the index.

"The principle I have used is the well-known law, 'that the heights of equiponderant fluids vary inversely as the densities of those fluids.'

"If I take open glass tubes, bent in the form of the letter U, and pour one fluid into one of the sides, and another fluid into the opposite side, (taking care to use the heavier liquid *before* the other,) the one being mercury, and the other water, they will stand at the height of 1 in. and 13 in., respectively. If I use alcohol and water, they will stand at the height of 10 in., and 8 in., respectively; the height of the one fluid being always greater than the height of the other, in the proportion in which its weight, density, or specific gravity, is less. In like manner, fresh water and salt water will stand at heights of 40 in. and 41 in., showing a difference of 1 in.

"The use which I make of this principle is as follows: I reckon the best scale of saltness of a boiler to be that which takes the common sea water as a standard. Sea water contains $\frac{1}{40}$ of saline matter. When the water has been evaporated, so as to leave only half the quantity of dis-

tilled water to the same quantity of saline matter, I call that two degrees of salt, or brine of the strength of two; and such brine would show (in fig. 3) the columns 40 and 42, or double the saltness of sea water, indicated by a difference of two inches. A further saturation would be indicated by a difference of 3, 4, 5, and 6 in. between the columns, and so indicate 3, 4, 5, 6, and any further degrees of saltness—a range which may be made to any degree of minuteness by the subdivision of the scale of inches. This scale is that which appears to me most simply applicable here; and it is that which I adopt for marine boilers.

"The mechanical apparatus which I have employed to give this indication is perfectly simple, and has the advantage of being such as the engineer already perfectly understands. To the marine boiler I apply two water gauges of glass, instead of one, as at present used: they both serve the purpose of the present glass gauges; and the pair would be valuable for this, if for no other reason—that there would always be a duplicate when one is broken—an accident not unfrequent. To these gauges I simply attach small copper pipes, so that one of them may be placed in communication only with the salt brine in the lower part of the boiler; the one then holds a column of brine, and the other of pure sea water, and each inch of difference shows the degree of saturation.

Steam engines.—The fundamental principle of the steam engine having been so well established, we are not to look for any marked improvement connected with it, but merely for modifications and simplifications of the arrangement of parts. Arrangements have been patented lately, for the purpose of applying the condenser to the high pressure engine. The familiar distinction between what are known under the general appellation of high and low pressure engines is, as you well know, that in the former, after the steam has acted against the piston, it is discharged into the atmosphere, and the steam introduced on the other side has to act against the pressure of the atmosphere; whilst, in the latter, it is discharged into the condenser, and there condensed, leaving a vacuum; so that the steam admitted on the other side of the piston does not meet with the resistance of the atmosphere. But, in the non-condensing engines, the steam is employed at a much higher pressure than in the condensing engines, and the simple application of the condenser makes them all of the same class; leaving, simply, the difference of pressure of the steam employed. But the objections to the employment of a condenser are numerous, and, in some localities, insurmountable; although, in a majority of cases, the great capacity of the condenser, and the large quantity of water necessary to condense steam of a very high pressure, are the leading objections; and it is to meet these, that the improvements in question have been devised. The condenser is so arranged as to permit the steam to pass through it, and to escape through a valve into the atmosphere, carrying with it the air and water previously contained in it; and when so much has escaped as to reduce the pressure to that of the atmosphere, the condensing jet is introduced, the remaining steam condensed, and the escape valve closed by the pressure of the atmosphere; thus leaving a vacuum for the remaining portion of the stroke.

Another patent has been granted for an arrangement of parts of a pendulous engine, which is hung at one end of the cylinder, instead of the middle; the cylinder being provided with a semi-cylindrical face, adapted

to a corresponding cavity in the frame work, and these parts provided with the necessary apertures to admit and shut off the steam by the vibration of the cylinder, and with a cock and other appendages for reversing the action of the engine.

The introduction of that class of propellers known under the various appellations of *screw*, *spiral*, and *inclined propellers*, which are generally applied one on each side of the stern post, and by means of two parallel shafts, has led to a great variety of arrangements of the connecting parts of steam engines, with the view to avoid the use of cogged gearing or straps, that are always objectionable in heavy machinery. Most of these arrangements are not the legitimate subjects of patents, and have not therefore been secured; but one has lately been patented, which is very ingenious and simple, and, if not liable to practical objections, (into which I have not had time to examine,) will present many advantages. It consists of a vibrating cylinder suspended on journals midway between the two shafts, and the piston rods (there being two) pass out through both ends of the cylinder, and are connected with the shafts—to one of them by an immovable connexion, and to the other by a joint link, to admit of sufficient play to pass the dead points. By this simple arrangement, the shafts are turned in opposite directions.

An improvement on the old balance valve has been patented, which consists in connecting the balance piston with the valve by means of a hollow stem, through which the steam passes to act on the face of the piston, instead of employing an outside passage for it. With the view to prevent the admission of too much steam at the time the crank is passing the dead points, and to prevent too much slamming, a patent has been obtained for providing the conical valve with a ring or flanch, which nearly fits the aperture of the valve seat, so that very little steam can pass until the valve has been so far raised as to carry this ring or flanch above the valve seat.

Patents have also been granted for regulating the periods of opening the valves, to cut off the steam, and permit it to expand in the cylinder, and thus economize fuel. In one of these arrangements, there is an arm on the stem of the steam valve, which acts against adjustable stops on the stem of the cut-off valve; so that the position of these stops may be changed at pleasure, and thus regulate the extent of motion of the cut-off valves—these two valves working on different seats, one above the other.

Another arrangement of valves consists in so regulating the period of the movements of the valves as to leave the piston free to complete each stroke *in equilibrio*, which is effected by opening the lower exhaust valve before the end of the upward stroke of the piston, and before the upper exhaust valve is closed, and opening the upper exhaust valve before the end of the downward stroke of the piston, and before the lower exhaust valve is closed; the steam valve being open without a lead, and after the exhaust valve on the corresponding end of the cylinder has been closed.

With reference to locomotive steam engines, but one patent has been granted during the past year, and that is for an entirely new arrangement of the engines. The two cylinders, instead of being arranged on each side of the carriage, are placed in the middle of the width, and one for each truck; the carriage being composed of two trucks—one for the boiler, and the other for the tender. The piston rods are connected each with

its appropriate set of wheels, by means of a sliding cross-head and connecting rods, so arranged as to admit of the vibration of the trucks in passing over curves, without affecting the action of the engines which are attached to the frame of the carriage. The two engines are connected together by connecting rods, which extend from the ends of the cross heads to cranks on eccentric cog wheels, for the purpose of equalizing the power and action of the two engines. ' There are other arrangements, of a minor character, which could not be made clear without drawings. Without expressing any opinion upon the practical value of these improvements, I may be permitted to express my admiration of the ingenuity which the mechanical arrangements exhibit.

4.—NAVIGATION AND MARINE IMPLEMENTS.

The only improvement which I have to notice, connected with ship building, is a mode of calking the seams of ships by means of a series of wedges, which are made widthwise, alternately wider at the point than at the butt, and *vice versa;* so that when they are driven into the seams, they wedge lengthwise of the seam as well as widthwise. This is equally applicable to the floors of cellars, and other wooden structures.

Sails.—An improvement has been proposed and patented for a new mode of cutting and rigging the sails of square-rigged vessels, by making them in two parts, each half extending from the mast to the end of the yards. They are hung to the upper yards by rings that slide on a rod called a "jack yard," attached to the middle and end of the yard, and are set and furled by means of out-and-in haulers. By this arrangement it is alleged that a vessel can be worked with greater ease, and will sail nearer the wind, than by the mode now practised.

Ship blocks.—The mode of strapping blocks, by carrying the iron strap outside of the block, is deemed to be objectionable, from the circumstance that the pin of the sheave is supported by the strap at too great a distance from the sheave, the thickness of the shell intervening. To remedy this evil, an improvement has been patented, which consists in attaching the iron strap to the inside of the cheeks; thus bringing the straps directly against the sheave.

Propelling boats and vessels.—Several patents have been granted for modifications of screw or spiral propellers, and modes of applying them to vessels. In one of these, the paddles are simply placed at an angle of about 45° with the line of the shaft, instead of being curved or twisted; and they are so connected with the shaft as to extend the surface or face of the paddle, at the middle of its width, to the centre of the shaft, or nearly so; the hub being formed between the middle and the edges—the inclining of the planes of the paddle with the axis of the shaft admitting of this form; for a straight line at the base of the paddle intersects the shaft at the middle of the paddle's width, at a point much nearer the centre than it does at the edges of the paddle. In this way, the necessary strength is given, and the face of the paddle extended nearer to the centre of the shaft than by any other known mode.

Another consists in giving to the plane of the spiral or twisted paddle an inclination from a radial line projected from the centre of the shaft.

As these various modifications have their advocates, and a strong con-

test for superiority is going on, I deem it advisable to withhold the expression of my opinion upon their relative merits.

Ingenuity seems to be on the utmost stretch to devise some mode of propelling vessels by means of apparatus placed below the water line, and therefore beyond the reach of the action of waves and shot; and as many entertain the opinion that the class of propellers above referred to are wasteful of power, various methods have been resorted to with a view of obtaining better results by other means. Several have lately been patented, the characters of which I will here point out, without approving or disapproving them. One of them consists of two rotating plates arranged at the bottom of the vessel, one forward of the other, in the line usually occupied by the keel, and provided with hinged flaps or paddles, kept close, or folded up even with the surface of the rotating plates, to which they are hinged, by the resistance of the water during a portion of their circuit, and thrown out by a cam or inclined plane during that portion of their circuit in which they are required to act on the water to propel the vessel. The cams that throw out the paddles are so arranged that their positions can be shifted at pleasure, and throw them out in any part of their circuit relatively to the line of the keel; and thus propel forward, backward, sideways, quartering—in short, in any desired direction.

Another is composed of a wheel with vanes, like a rotary fan-blower, working horizontally in a case within the vessel, so arranged as to admit water to the centre of the wheel; which, by centrifugal action, is discharged at the periphery through tangental pipes extending in different directions to the stern, bow, and sides of the vessel, and provided with gates or valves, so as to discharge the water from any of them at pleasure, and thus propel the vessel in the direction desired. The idea of propelling vessels by means of currents of water admitted to the centre of the wheel, and discharged in tangents at the periphery, is old—a patent having been granted for it before; but the addition of the tangent pipes, for the discharge of the water in different directions, constitutes the essential feature of novelty under the present patent.

A modification of the duck-foot paddle has also been patented; the main object of which is to adapt it to the shifting of the paddle, with the view of propelling backward; together with an arrangement to insure the proper presentation of the paddles in the propelling and returning action.

The common paddle wheel has long since been arranged with the paddles forming an angle with the line of the shaft—the two halves inclining in opposite directions, and forming an angle in the middle; and a patent has lately been granted for modifying this arrangement, by overlapping the two halves of the paddle in the middle, and placing one forward of the other, so as to leave a space between them for the discharge of water.

The great rivalship between railroads and canals, and the necessity of reducing the cost of transportation on the latter, have led to numerous experiments in various parts of the country to apply steam as a mode of propulsion. The side wheels are known to be objectionable for many reasons, but particularly on account of increasing the width of the boat. It was long since proposed to remove this difficulty, by placing the paddle wheels at the bow or at the stern; both of which were soon abandoned. Of the numerous plans lately devised for this purpose, but one was patented during the past year, which consists in placing the paddle wheels on each

side of the bow, with the plane of the paddles at right angles with the general plane of the bow; and effecting this by either making the paddles parallel with the shaft, and placing the plane of the wheel parallel with the general plane of the bow, or by placing the shaft at right angles with the keel, and the paddles at an inclination with the shaft.

Ice breakers.—For the purpose of keeping harbors clear of ice, various modes have been suggested of adapting saws and hammers to the bow of a boat propelled by steam, by means of which the ice was to be cut into strips, and then broken into small blocks, and these blocks pushed to each side of the boat by guards placed at the bow, and back of the breakers. A patent has been granted for so modifying the form and arrangement of these guards as to depress the blocks of ice below the surface, and push them under the surrounding ice, and thus leave the channel clear, by a combination of inclined planes.

Life preservers.—The danger of leakage in that class of life preservers which consist of inflated bags, by forcing air into them, led to the substitution of a helical spring, made of metal or other substance, or rings placed within a bag, the heads of which are to be provided with valves, to admit air in drawing it out, and with hooks, to secure the belt around the body. And as it is desirable to make these in the form of an ellipsis, in their transverse section, a single spring or set of rings, it is supposed by some, might be collapsed by the pressure of the water; and, to avoid this difficulty, it has been improved by composing it of two wire helices attached together, side by side.

Harpoons.—Various devices have been resorted to, to improve the harpoon used by whalers; and, amongst others, it was proposed, some years ago, to enclose within the harpoon a vessel containing prussic acid, which, on striking, would be diffused, and thus kill the whale. As an improvement on this, a patent has been granted for putting a bottle of explosive mixture within the fluke of the harpoon, which is jointed to the stem or handle, so that the pull of the whale will open the fluke and explode the mixture.

5.—CIVIL ENGINEERING AND ARCHITECTURE.

Civil engineering.—The number of improvements developed and patented during the past year, under the depressed state of civil engineering, occasioned by the temporary prostration of our works of internal improvement, would be matter of surprise to one unacquainted with the energy and vigor of the American character, which has always exhibited its most brilliant qualities in adversity; and hence we find that invention is resorted to as a means of release from difficulties. The number of patents granted for improvements in this branch of the arts should by no means be considered a fair exhibit of the improvements made in the country, for many of them are never secured by letters patent. Nor can they be gathered, as in England and France, from the journals devoted to science, and the transactions of associations of engineers; for there this class of publications and such societies are very numerous, and the narrow limits of the territory bring all this kind of information within a small compass, whilst in this country it is the very reverse; publications of this kind are very limited, and the vast extent of our territory renders it difficult to

bring together, for consultation and interchange of ideas, engineers scattered over various portions of the country.

Improvement of natural watercourses.—Of the improvements made in the United States in this branch of engineering within the past year, very few have come under my notice in an authentic shape; but as I have met with some in the foreign journals, which contain important suggestions, I will notice their chief characteristics.

One of them is for making floating platforms, to be used for the formation of breakwaters, floating bridges, beacons, the protection of pier heads, embankments, and all similar purposes. It consists in the construction and adaptation of sloping platforms, mounted upon, connected to, or supported by, floating hollow vessels or caissons; by which the platforms are always maintained in sloping or oblique positions, and are enabled to rise and fall with the tide. The lower edge of these platforms, or the parts extending under water, are moored to the bottom by anchors or other known means, and the whole presents an inclined surface to the action of the wind and waves.

The rapid decay of all wooden structures exposed to the alternate action of water and air, has led to various propositions for the substitution of iron. Among others, the plan proposed in England by Mr. Johnstone for the construction of breakwaters and similar structures, appears to possess some merit. The plan is as follows, viz:

"A series of distinct and separate caissons, each presenting in external form one-half of the pier of a bridge, with its cutwater presented to the sea, is to be formed in four to six fathoms water, according to localities. Each caisson to consist of cast-iron plates of large size, and one inch in thickness, (prepared with coal tar, so as to resist corrosion,) bolted together by means of four-inch flanges; the whole to be filled with concrete, granite, or other suitable material. The lower part of each caisson, to the height of thirty-two feet, having a foundation platform of wood, to be completed on shore, and, when prepared, to be launched, and towed out to its position and then lowered; the whole to be secured to the bed of the sea by means of cast-iron piles, driven through tubes of the same material. As the upper part of the caisson is put together, so is the interior to be filled up with the solid materials, and to be coped with clamped masonry. The weight of each caisson complete would be 4,500 tons; and the cost of a breakwater on this principle, extending to nearly a mile in length, is estimated at £297,800."

The following is another mode of attaining similar ends, viz:

"This invention is divided into four parts, and consists—1st. In the application of hollow piles of iron in the construction of piers, embankments, breakwaters, &c.; which piles may be of a circular or other convenient form, and are sunk by withdrawing from their interior the sand and other matter occupying the space upon which they stand. 2dly. In the application of skeleton frames or cases in connexion with hollow piles. 3dly. In forming or injecting by hydraulic pressure, around the feet of the piles, such chemical solutions as will solidify or consolidate the sand or other matter upon which they stand; and 4thly. In the application of cements in a state of dry powder; which cements are intended to solidify under water, and form an artificial rock.

"The mode of driving hollow piles, as related in the first part of the specification, is as follows: A hollow pile is provided, open at both ends.

Presuming the place in which it is to be driven be of a sandy nature, and covered with water, the pile is placed on one end in its destined place, such end being open; the upper end being closed by an air-tight lid or cover, and connected by means of a pipe with a receiver. Another pipe also branches off from the receiver, and is connected with a three-barreled air pump, which, on being set to work, exhausts the air from the hollow pile, and raises the sand and water from the bottom thereof, and causes it to sink to the depth required; the sand and water passing through the pipe, which is connected to the top of the pier or pile, and into the receiver, which can be emptied as occasion may require.

"In some descriptions of soil, the inventor states that it will be found necessary to loosen the soil, which may be done by passing an instrument down the pile adopted for the purpose; and, should it be required, water may be applied in the same manner. When the piles meet with a hard substance, the inventor proceeds to sink them by boring down the tube, in the manner of boring Artesian wells.

"When the piles to be driven are of large diameter, the same mode of driving may be adopted, by the application of a movable tube, which the inventor calls an 'elephant or operating trunk;' the sand and water being raised through the operating trunk, which is connected at its outer extremity, by means of a flexible tube, to a receiver, from which the air is exhausted by the air pumps; the operating trunk being guided by a man, who, for the sake of security against the bursting up of the loose sand, stands in a tub or "cobble," where he is enabled to move the operating trunk round the foot of the pile.

"In order to secure the piles, which may be driven at any convenient distance from each other, the inventor employs what he terms 'skeleton frames.' These frames are cast with holes to receive the ends of the piles; so that, when applied, they embrace and bind the whole together. After the piles have been sunk, they may be wholly or partly filled up with rubble stones or concrete; but, before doing so, should the soil be of a yielding nature, it will be necessary to consolidate it, which the inventor does by forcing or pouring down the hollow pipes such chemical solutions as the nature of the soil may require, which may be ascertained by analyzing a small portion of it; and, according as silicious or calcareous matters predominate, it will be ascertained what chemical substances will be best calculated to consolidate and solidify the same.

"The cements to be used in a dry state are those known as hydraulic cements; and may be used alone, or mixed with stones, sand, or shingle; and may be delivered at the foot of the pile, or other structure, by means of a hopper, having a tube leading from it to the structure intended to be cemented; at which place the current mixes with the water, and consolidates the whole mass."

The great amount of surface which light-houses present to the action of the waves, together with the difficulty of finding a bed suitable for a solid foundation where such structures are required, induced the British Government to test the plan of building them of iron on iron piles; placing the house above the reach of the waves, and therefore presenting only the small surface of the piles to their action. The experiment has been fully successful, and will be generally adopted there. It appears to me to deserve the serious attention of our Government.

The construction of these light-houses was very much facilitated by an

improvement patented in England several years ago, the value of which has only very lately been appreciated: it is called the screw mooring, and was invented chiefly for the purpose of mooring a floating dry dock, invented and patented in England in the year 1832. It is applicable to piles as well as to mooring chains, by attaching it to the lower end of the pile, or that part which is to be inserted in the ground, or bed of a river, &c. The following description of it is taken from the Civil Engineer and Architects' Journal, an English publication, viz:

"This sort of mooring is constructed, as its name implies, on the principle of the screw, but differing essentially in form from that well-known instrument; for, while the spiral thread makes little more than one turn round its shaft, it is, at the same time, extended to a very broad flanch; the hold which it takes of the ground being proportional with its breadth of disk.

"When it is necessary to provide against a heavy strain, Mr. Mitchell has moorings of 3 feet 6 inches diameter; and the principle is capable of still further extension.

"A mooring of the above diameter presents a resisting surface equal to about 10 square feet, whereas the palm of the largest anchor in the British navy does not exceed half the size; and some estimate of its holding powers may be formed, when it is shown that this broad surface can be screwed to a depth many times greater than that to which the palm of an anchor can ever descend.

"The method of laying down the mooring is briefly this: A strong mooring chain being so attached to it as to allow the screw to turn freely without carrying the chain around with it, a powerful iron shaft is then fixed firmly in the upper part of the mooring, (which is formed square for that purpose,) setting in the same manner as a key to a harp or piano forte in winding up; it is then lowered by the mooring chain, joint after joint being added to the shaft, till the mooring has reached the ground; light levers, of 12 feet in length, are then applied to the shaft, in the manner of a capstan, when the operation of screwing the mooring into the ground commences.

"Two boats, or barges, having been moored firmly, head and stern, close alongside each other, and the upright shaft rising between them, about midships, the men place themselves at the bars, and move round from one boat to the other; the two giving them a safe and convenient platform. By a simple contrivance, the levers are occasionally shipped upwards as the screw and shaft sink into the ground.

"When the number of men employed can no longer force the screw round, the levers are removed, and the shaft drawn out of the ground, leaving the mooring firmly imbedded, with the chain attached to it; a buoy being shackled to the other end of the chain, the work is completed; the time required for the whole operation seldom exceeding a few hours."

Although this improvement has slumbered unnoticed for so many years, it is now deemed so valuable, that the proprietor has just obtained letters patent for it in this country, for the remaining portion of the 14 years from the date of the letters patent granted in England.

There is probably no branch of civil engineering which presents so many difficulties as that of improving the navigation of shallow streams; and, as there are many such in various parts of our country, and the flood gates now used are known to be very imperfect, I deem it of importance

to call attention to a system of flood gates with movable wiers, reduced to practice in France. The following is a copy of a report made on this invention, viz:

"*Report made to the Society for the Encouragement of National Industry, by M. Vanvilliers, in the name of the committee of mechanical arts, on a system of flood gates for watercourses, with movable wiers, invented by M. Thenard, principal engineer of bridges and highways; and executed on the river Isle, department of the Dordogne and the Gironde;*" for which the society, on the 6th of September, 1843, awarded M. Thenard its gold medal.

[Throughout the report are retained the French technical terms *barrage mobile* (a movable wier) and *hausse*, (flood gate, or sluice.)]

"Navigation, irrigation, and industry, require that, in almost every situation, the running waters should be raised up, in the beds that hold them, at those times when they are least abundant. In séasons of superabundance, it is also of paramount importance that waters should be promptly and freely permitted to flow on in their natural courses. For small watercourses, these conditions have been amply fulfilled by the construction of sluices, flood gates, and wiers, the varied compositions and effects of which are well known. In the case of great waters, the problem is more difficult to solve; in consequence of ice and broken pieces of floating bodies being drawn in by the current, they require that all obstacles opposed to the free passage of the waters should be instantly removed; to this effect has the ingenuity of man been directed, for the purpose of applying them for the uses of navigation, irrigation, &c.

"M. Thenard, engineer-in-chief since 1828 of the canal operations on the river Isle, which stood greatly in need of carrying out the foregoing conditions, has been occupied unceasingly in search of, and experimenting upon, the means of arriving at this result—having so far succeeded in combining and executing such dispositions, that he can sustain the waters of the river Isle at 7 feet 4 inches above the level of the bed; procure a convenient draught of water to get boats up during dry weather; maintain them at this level sufficiently long, so that the free flowing of the river is incapable of drawing them away; and, having arrived at this point, restore the waters to their natural course, in order not to expose the valleys to submersions prejudicial to establishments which have for their objects the keeping back of water and navigation.

"The first report addressed to the administration of bridges and highways, on the trials made by M. Thenard, is dated in 1831; it announced the good opinion formed by them by the inspector of the division. In 1839, so as to verify it, another commission composed of inspectors genral and divisional of bridges and highways, was appointed by the Government. M. Thenard, having perfected with skill and success a happy idea of a provisional flood gate, suggested to him by the divisional inspector, (M. Mesnager,) during the inspection of the navigation of the *Isle*, was enabled to render his system of *barrage* more complete and applicable to many other rivers. The commission concluded, at one visit, that experiments should be made and executed by the commission, assisted by M. Thenard, the inspector of the division, and many engineers from the neighboring localities. On the 4th of July, 1841, the commission concluded their experiments, and reported thereon.

"Up to this time, M. Thenard had not had occasion to apply his system, except to fixed existing *barrages*, and to elevate the water to 2 feet 6 inches or more above the crest. The central government manifested a desire that he should elevate the water from 3 feet to 4 feet.

"Confiding in the certainty of his system, M. Thenard obtained authority to make a trial, the important results of which are the object of his communication to the society and of the present report; in which the retained body of water above the lower level was raised to a height of nearly 9 feet.

"The convictions to which these trials and observations have successively led M. Thenard are as follows:

"The trap doors or sluices that M. Thenard calls *hausses* are attached to the hinges on the upper horizontal surface of the stationary portion or apron of the *barrage*, and in number sufficient to equal its length; the sluices are in length, horizontally, about 4 feet, and in height 5 feet 6 inches. On the lower face there appears an iron prop, similar to the props which are adapted to certain dressing glasses and reading desks, and which abuts against a stop fixed in the apron in the dock.

"When the *hausses* are raised and propped up, they form a partition or *barrage*, which stops the water and raises it up the river, even to exceed its natural level; if the *hausses* are let down, the water flows and resumes once again its natural course.

"To produce this effect, there is placed along the entire length of the *barrage*, and above the apron, a flat iron bar, which runs across the river, and along the foot of the props. This bar has at one of its extremities a rack, which works in a pinion fixed at the bottom of a vertical axis, that can be made to turn from above by a capstan. This rack is made to move backwards or forwards as many inches as it has *hausses* that require manœuvring. The bar has on its lower edge a tooth or cleat on the side of each prop, and which are subdivided in such a manner, that, by the removal of the bar, the foot of each prop (the hinge of which permits a slight circular motion) is successively drawn away from its bed or berth, when the *hausses* are left without support, to turn on their hinges, and lower themselves one by one, at pleasure, from up the river to its downward fall, on the apron of the *barrage;* the props at the same time stretching themselves down the stream.

"When the overflow of water is stopped, and it is required to raise up the *hausses*, the current is opposed to bringing them back again from the lower to the upper part of the river. To accomplish it, use is made of a system of *contre-hausses* of the same length as the *hausses*, but of a height less by seven inches, and being capable also of being turned down towards the up-stream; during all the time that the *hausses* are either raised up or lowered down, the *contre-hausses* remain lying on the apron, where a spring latch retains each of them against the action of the current, which has a tendency to lift them up. There is an interval of about a foot between the range of *hausses* and of *contre-hausses*.

"A flat bar of iron, of the kind already described, with the shifting movement, regulates the opening and closing the *contre-hausses*. At each progression of an inch, a staple presses and releases the latch; and the corresponding *contre-hausse*, submitting to the effort of the current, turns round on its hinges, and raises itself to a vertical position. A bridle chain clamped on the solid part of the apron prevents it from going too far. By

this method, which produces an immediate effect, is formed a second *barrage* above that which existed before the letting down of the *hausses;* the current remains suspended ; the upper edge opposes the flow of water, and allows the lock-keeper to raise the *hausses.*

"To facilitate this operation, M. Thenard has placed on the upper part of each *contre-hausse* an iron man-rope, which supports an iron gangway suspended at nearly the same level to which it is intended the retained body of water should rise.

"The lock-keeper stands on the gangway, furnished with a little portable windlass, which he rests on the man-rope ; he rolls this rope on the cylinder of the windlass, and draws towards him the *hausse*, and with it the prop or stay that supports it against the slipper, and at the same time he hooks it on the *contre-hausse.* He proceeds thus through all the *hausses* in succession. When all are hooked, he hastens the filling up of the space between the *hausses* and *contre-hausses*, by drawing with his hand the vent plugs fixed in the *contre-hausses.* This done, the latter are balanced by a volume of still water; the lock-keeper then unhooks in succession each *contre-hausse*, and abandons it to its own weight, (which exceeds that of the volume of water which it occupies,) to fall down on to the stone work of the *barrage;* it then latches itself there anew, and the body of water is once again held in perfect retention by the *hausses.*

"These manœuvres are performed with precision and quickness. The report of July, 1841, states, that at the *barrage* of Coly, which is 57 feet 6 inches long, with the *hausses* 2 feet 8 inches high, two men, in 8 minutes, lowered the *hausses*, raised the *contre-hausses*, then righted the *hausses*, and re-laid the *contre-hausses.* In this space of time, 16 seconds were sufficient to lower the *hausses* and make the *barrage* disappear ; and 20 seconds *only* were occupied in raising the *contre-hausses*, and restoring the mass of water in retention.

"The report of the commissioners of the Academy of Science, Belles-lettres, and Arts, at Bordeaux, of the 10th of January, 1843, states, that at the *barrage* of St. Anthony, which is 27 feet long, formed by 7 *hausses* of 4 feet long each, and 5 feet 6 inches high, and by 7 *contre-hausses*, the *barrage* manœuvre was performed twice in 30 minutes—*i. e.* in one minute per linear yard of *hausses* and *contre-hausses.* M. Thenard flatters himself that the height of 5 feet 6 inches is not a *limit* for the application of his system ; he has been obliged to confine himself to this height at the *barrage* dam at St. Anthony, owing to local circumstances ; he thinks he could carry it to the height of 10 or 13 feet the *hausse.*

"Already, by practical experience, he has solved a beautiful problem in hydraulics, which has frequently occupied the attention of engineers, and of which there exists but one other solution, totally different : it is the work of M. Foirée, divisional inspector of bridges and highways.

"M. Thenard has combined in his construction many capabilities which facilitate the working of floating bodies, and prevent the inconveniences which these, and matters deposited by the current, might occasion ; the consequences of which would be to perplex the operations of the *hausses* and the *contre-hausses.* He has fixed vent holes in the partitions of the *hausses*, to drive away down the river such bodies as may have been stopped or deposited on the apron. The teeth or cleats of the iron bars move in the whirlpools ; the entrance to which is closed by grooved traps, which render the deposites less abundant than might be supposed. He can re-

move those which have already formed themselves, by a pressure and a current produced by turning water through the upper opening of the pipe in which turns the axis of the pinion. To avoid the loss of water which must ensue from openings or interstices of about an inch (which cannot be avoided) between two consecutive *hausses*, or between the *hausses* and the side walls, there is placed a little board, which covers the joint, and hinders the flow.

"Experience has proved that the letting down is unattended with hurtful jolting, because it is done under a sheet of water which is flowing with the greatest rapidity, and which instantly deadens all shocks.

"The *contre-hausses*, under the trench of water which covers them over, seem to hesitate a moment in raising themselves up under the impulse of the current; they do not attain any great degree of velocity until, in the last portion of their movement, the acceleration is greatly modified by the mass of water the *contre-hausses*, already raised up, sent back laterally against the others. Up to the present time, there has not been any serious difficulty experienced in performing the manœuvres; branches, weed, gravel, and sand, which might interfere with them, are easily dragged away or removed.

"It is easy to conceive that, within certain limits, *hausses* and *contre-hausses* of a greater height than 5 feet 6 inches can be employed and worked. It is the work of experience and time to pronounce upon the preservation, keeping in repair, and replacing the movable parts, under and out of the water, of which the apparatus of M. Thenard's *barrage* is composed. It is under the proof of ice formed underneath, raised to the surface, and carried away by the current against the *hausses*, that we can judge definitely of the power of resistance in the actual constructions, and the modifications that may be applied to them. We can rely, with confidence, upon the skilful perseverance of M. Thenard to ward off any inconveniences that have not as yet presented themselves. In the mean time, the *barrages mobiles*, such as are executed at St. Anthony, reflect honor on the inventive talent of M. Thenard. They appear to be susceptible of numerous and important applications, and to justify the approbation that the committee of mechanical arts deem themselves empowered to give, and recommend the council of administration to award them.

"The committee propose, besides, to insert in the records of the society the present report, as well as the drawings and descriptions which accompany M. Thenard's memorandum."

Saws have long since been combined with a boat or scow for the purpose of cutting off piles under water; but this operation has always been accompanied with a serious difficulty, viz: the motion of the scow occasioned by the swell or waves in harbors. To avoid this difficulty, the saw is now combined with the scow, by means of a sliding frame, balanced in the sliding cheeks by a counter-weight, so that the rise and fall of the boat by the swell does not seriously affect the operations of the saw. This device has been reduced to practice in Boston harbor.

In England, the common pile driver has been modified by attaching the ram directly to the end of the piston rod of a vertical steam engine placed above it, or with a horizontal engine, by means of a rope or chain passing over and under two pulleys, so as to dispense with the monkey, and thereby increase the velocity of the action of the ram. The same

method it will be seen, by reference to class 1st, has long since been applied to forge hammers.

Canals.—A patent has lately been granted for an arrangement adapted to the support of canal lock gates from above, instead of having them run on a plate at the bottom, by means of a stirrup extending from the outer edge of the gate to a post so inclined as to bring its upper end just over the axis of the gate hinges; the post being sustained by log chains, and the stirrup provided with a swivel screw for adjustment. There is connected with this an arrangement of cords and windlass for opening and closing the gate from the side opposite to that on which the gate is hung. The improvements in propelling canal boats were noticed under the class of navigation; but I there omitted to state that it has been proposed in Europe to propel boats on canals by means of a pipe at the bottom of the canal, from which water is to be exhausted, that the boat may be impelled by the pressure of the water on a piston in the pipe, and connected with the boat on the principle of the atmospheric railroads, simply substituting hydrostatic for pneumatic force; and, of course, subject to practical objections of a more serious nature than those urged with so much force against the atmospheric system of railroads.

Railroads.—The serious accidents that have occurred on railroads, by the use of switches to guide the cars from one track to another, has, from the commencement, occupied the serious attention of engineers and others, without any decided beneficial result. All the plans heretofore suggested were either impracticable, or would not prevent accidents if not properly shifted by the attendant. But it is now my pleasure to notice the grant of letters patent for an improvement which presents decided advantages, and which has been fully tested on the Reading railroad. It consists in the employment of two parallel bars attached to, and moving with, the switch; so that, when the switch has been shifted, and put in connexion with the turnout rails, they are in line with the rails of the main track; and, in the event of neglect on the part of the attendant to replace the switch, a car from the main track will run on to these parallel bars, which are, at their fixed end, connected with the main track by means of inclined planes and guides, so arranged as to elevate the flanch of the wheels (which are outside the track) over the rail, and guide the whole of them to the line of the track, and thus prevent the cars from running off.

Many accidents result, also, from the manner of uniting the rails at the junction of the sections; for, if they separate sidewise or vertically, forming what are called "snake heads," either the flanch or tread of the wheels is caught, and the car thrown off the track; and hence many devices have been resorted to, to prevent such serious results. The general mode practised is the insertion of the ends of two contiguous sections within a block of iron called a "chair," and secured therein by screw bolts or wedges; but the tremulous motion communicated to the rails by the locomotive and train of cars in a short time loosens the screws or wedges, and therefore it becomes necessary to employ men along the whole line, to examine these fastenings carefully. To remedy this evil, it has been proposed to make the key or wedge with a spring catch on the end; which, when fully inserted, catches on the outside of the chair, and prevents it from being thrown out. Another mode has been suggested in England, which consists in making the key or wedge hollow, and therefore elastic. As a substitute for these chairs, and screw or wedge fastenings, it

has been proposed to cast the sections of the rails with webbed flanches on the sides and towards the ends; the flanches on one section projecting beyond the end of the rail, to embrace the contiguous section, the flanches of which do not extend to the end. And, to prevent the rails from breaking by violent concussions, they are cast on wrought iron rods.

As a means of preventing accidents from "snake heads," or the ends of rails thrown up out of the proper line, a patent has been granted for attaching curved and inclined guides to the car in front of the wheels, and between the front and back wheels, which strike the "snake heads," and force them down to their proper position until the wheels pass over them.

The breaking of cast iron car wheels, in consequence of the strain which the metal undergoes whilst shrinking and cooling in the mould, has been a source of great expense to railroad companies; and therefore many expedients have been resorted to, to discover some plan of preventing this evil. The hub has been connected with the chilled rim by means of a dished disk; but this was deemed objectionable. And lately a patent has been granted for making the disk in such a form that a plane bisecting the wheel in its axis shall present a waved line, or one having a convexity and concavity on each face. Many such wheels have been made in the city of Boston, which are spoken of in terms of commendation.

Several patents have also been granted for arranging the tracks of railroad cars with the view to obtain a greater amount of strength with a less weight; to adapt the trucks to the turning of curves on roads, by having each wheel in a separate frame, so that the axles can be thrown in the radii of the circle. For a mode of coupling cars, so that one car deviating from the line of the succeeding one, to a greater extent than is required to follow the curving of the road, forces open a spring clasp on the coupling, which liberates the coupling-pin, and thus permits the forward car to run off, without carrying with it the whole train; and for improvements in previously patented oil boxes for the journals of railroad cars, contrived with the view of preventing the introduction of dust, &c., and the escape of oil.

The fact that iron deteriorates in strength by vibrations, established by carefully conducted experiments, has led to a variety of contrivances for preventing the vibration of railroad car axles; but I have not met with a suggestion worthy of serious consideration.

It was proposed, a few years since, to make these axles tubular, instead of solid, to render them less liable to break by torsion; but it has been ascertained in England, by carefully conducted experiments, that the solid axles resist this action much better than the tubular axles. And I find that, since these experiments, it has been proposed to make them in two parts, by inserting a solid bar within a tube; but upon what reasoning this proposition is based, I cannot find.

The "atmospheric railway," as it is miscalled, continues to attract much attention; and although, in my humble opinion, it can never supersede the locomotive system, (for reasons which would require too much space for such a report,) I nevertheless deem it proper to point out the improvements in this system, which have been suggested during the year. One of these is the invention of M. Chameron; and the following is a description of it, extracted from the Civil Engineer and Architects' Journal, for November, 1844, page 389:

" He places between the two ways a conductor, or pipe, formed of iron plates and bitumen, submitted to a high pressure. This conductor, which is of a diameter proportional to the impulsive force that is required, is buried in the soil. Throughout its length, and at certain distances, are established branches, which come and terminate at the centre of each line: these branches are composed of a cylindrical tube, to which is attached a cock, the key of which carries a cog-pinion. On this cock is fixed vertically a pipe, in the form of a hollow cone, flattened, and divided internally by a transverse partition. This cone is surmounted by a cylindrical aspiratory tube, placed horizontally and parallel to the line. The diameter of this tube is one-half less than that of the conductor. It is divided into two equal parts by a transverse partition, which closes hermetically; its length is about a metre. At each of its extremites there is an external gear, and a hollow cone pierced by a certain quantity of holes. On one of the sides of the branch a groove is placed, in which slides a vertical rod; the superior extremity of this rod is furnished with a plate, and the inferior extremity with a hook, which cogs with the pinion fixed to the cock. The inventor causes to travel on these branches an articulated tube, which he attaches under the wagons by means of springs and chains. The length of this tube is that of the train; its diameter is equal to that of the conductor; it presents a longitudinal opening, shut by a valve, with two parallel and juxtaposed partitions. Each extremity of this tube is widened, and armed with a valve and lever. Under the first and last wagon are fixed two movable supports, placed obliquely, and parallel to the wagons.

" *Description of its operation.*—Stationary hydraulic or steam engines, established at a distance of 10,000 metres (about 6½ miles) from each other throughout the extent of the line to be worked; these engines serve to work pneumatic machines, which are put in communication with the conductor, or pipe, placed between the two lines. When there is necessity to set a train in motion, there is attached beneath the wagons a towing line; one of the valves placed at the extremities of this tube is opened, whilst the other remains shut; and that part of the towing tube which has the valve open must be previously fixed in an aspiratory tube; this process being adopted, and after having effected a vacuum in the conductor, the cock of the branch in which the towing tube is engaged is then opened by hand. The communication is immediately established between the conductor and this towing tube by the interior of the branch, and by the aspiratory tube. The atmospheric pressure is immediately exercised in the fixed transversal partition of the aspiratory tube forming the basis; it exerts itself, at the same time, throughout the external surface of the valve formed of the towing tube, which forms the point of resistance. This pressure determines the movement of the towing tube, which slides in the gear, adapted to the aspiratory tube. At the same time, the longitudinal valve of the towing tube opens for its passing on to the branch, to shut itself immediately afterwards. As soon as the posterior extremity of the train arrives at this branch, a support shuts off the cock; and, at the same time, another support, fixed at the head of the first wagon, causes the cock of the second branch to open, by pressing the hook; at this moment, the vacuum ceases to be communicated to the towing tube by the first branch, whilst it is produced by the second. The shut-off valve of

the towing tube then opens, to slide over on to the first aspiratory tube; this valve shuts instantly, by its own weight. The atmospheric pressure acting again, the towing tube draws the train to which it is attached. To suspend the progress of the train, they avoid opening the cocks, by raising the supports; to stop or neutralize the speed, they employ breaks; to retrograde, they open the valve of the towing tube which was shut, and shut the other valve which was open."

And the other is the invention of a Mr. John Aiken, patented in England last year. The following is a description of the leading characteristics, viz:

"In the construction of atmospheric railways, the air from the traction pipe (as is well known) is removed by means of air pumps; and some difficulty has been experienced in getting out the air, so as to obtain a good vacuum, in consequence of the air at each succeeding stroke of the pumps getting more and more rarefied. Now, the object of this invention is, in the first place, to obtain the required vacuum, by causing the traction pipes to be filled with water, and then allowing the same to escape through the eduction pipes, from 32 to 33 feet long; by which means a better vacuum can be obtained in the traction pipes than by the aid of air pumps. The object of the second part of this invention is to obtain a more perfect air-tight covering for the longitudinal valve of the traction pipe, by covering such valve, and also the pipe, with water, for the purpose of retaining the vacuum obtained therein."

Bridges.—But one patent has been granted for improvements in bridges, which consists in a modification of one of the known modes of cambering the truss frames. Heretofore this has been effected, in some bridges, by tension rods extending from the foot of one post to the top of the next, inclining in opposite directions from the middle of the bridge towards each end; the rods being provided with screw nuts. And the modification consists in the addition of another set of tension rods crossing the first set, by means of which the inventor alleges that he can more effectually camber any part of the truss than by the single set of rods, as previously used.

Implements used in excavating earth, &c.—Several patents have been granted for machines or instruments for removing sand bars or shoals in rivers, &c.; for excavating and removing earth, and for making ditches for irrigation and other similar purposes; but as they do not present any marked characteristics which can be made clear without drawings, I am under the necessity of omitting any description of them.

Architecture.—Metal roofs.—For several years back, much attention has been directed to the construction of metal roofs, or metal coverings for wooden roofs; and during the past year two patents have been granted here, for improvements in the mode of applying metal coverings; and one in England, for making metal roofs. The first of these consists in attaching to the top surface of the rafters, from the eaves to the tip of the roof, a strip of sheet metal with the two edges turned up, and embraced by cleats nailed to the sides of the rafters, so that these strips form gutters from the tip to the eaves of the roof. The edges of the sheets of metal, which constitute the covering of the roof, are secured by being lapped over the turned-up edges of the strips; and then the two are bent or lapped over, the one embracing the other, which effectually prevents all leakage. The second consists in securing to the wooden sheathing triangular slats of wood, in

pairs parallel to each other, and extending from the eaves to the tip of the roof; the space between each pair being equal to the width of a sheet of metal, and the two slats forming a pair being so far apart as to admit three or four thicknesses of metal. One or two strips of metal are secured to the wooden sheathing between the two slats of a pair, the sheet of metal on each side is bent over, the turn edge being inserted between the slat and the strip of metal, the upper edge of which is then bent or lapped over the sheet. In this way, each pair of slats, and strip or strips of metal, between and lapped over the sheets, forms a ridge from the eaves to the tip of the roof. And the mode of making iron roofs consists simply in having the iron rafters extending from the eaves to the tip of the roof grooved, to receive the edges of the sheets of metal, which are bent and properly secured therein.

Fire-proof ceilings.—A patent has been granted for making fire proof ceilings, by means of iron laths, which consist of strips of sheet-iron, with the edges turned in towards the middle, to form a dovetailed grove, attached to iron rafters placed diagonally across the room, to prevent (as the inventor states) the expansion and contraction from cracking the plastering; the mortar, or plaster, is held between the turned edges of the laths. Under some circumstances, and with the view of giving additional strength, another set of laths, similarly formed, are secured to the first set, and crossing them, to receive another layer of plaster or mortar on top, which, uniting with the layer below, adds strength to the whole.

Doors.—An improved mode of hanging large double doors, called "sliding doors," has lately been patented and introduced in Philadelphia. It consists in hanging them, by means of stirrups and rollers, to an iron bar in the partition above the door, so as to avoid the use of a rail on the floor, and prevent all injury to the carpeting.

6.—LAND CONVEYANCE.

In the construction of carriages, several patents have been granted for the following devices: A mode of connecting the front axle-tree with the body, by a modification of what is sometimes called the "fifth wheel," which consists of a horizontal circular plate attached to the upper surface of the axle-tree, in the form of a cross, the outer ends of two of its arms being so formed as to embrace the rim of the wheel, to aid the king bolt in forming the connexion; and the other two arms, which rest on and are bolted to the axle-tree, being bent down, that the axle-tree may rock to a certain extent before these arms come in contact with the under face of the wheel: For a mode of connecting and bracing the elliptical springs on the front and back axle-trees, by means of two semi-elliptic springs, jointed to the two sets of springs, and connected together by stirrups and a swivel screw, to regulate the tension of the connecting and bracing springs: For an improvement in spring perches; and for a modification of the well-known mode of forming the connexion between the body and the running gear, by means of levers jointed to the body, the springs being attached to the body instead of the frame. Under the present arrangement, the springs being within the seat, and the connexion formed between the levers and the frame being by means of cranked axles, one of which is permitted to rock, and both made reversible so as to place the cranks up or down, and thus elevate or depress the body.

Patents have also been granted for minor improvements in the boxes of carriage hubs; in the manner of connecting the hub with the rim, by so forming the spokes as to embrace the hub, instead of being inserted in it; and for methods of detaching the horses from carriages, by liberating the connexion between the traces and the swingle-trees.

7.—MILLS, AND MACHINERY CONNECTED THEREWITH.

Grinding mills.—The patents granted during the past year for mills are not very numerous, but exhibit some decided features of novelty; on which I will not undertake to express any opinion, leaving it to those engaged in milling to decide upon the merits of the alleged improvements; for in this branch of mechanics practical experience is highly important to a proper judgment.

Under one of these patents, it is proposed to have a dead spindle pass up through the bed stone, with a countersink in its upper end to receive a point projecting from the under part of a "chuck," which is grooved out around the point, to receive the rim on the end of the dead spindle formed by the countersink. The under side of the bale, which is attached to the eye of the runner, has also a point which rests in a countersink in the upper surface of the chuck, to balance the runner; and the upper part of this bale is adapted to receive the spindle.

Another is for a mode of dressing the stones, in which about one-half the surface of the bed stone, from the periphery inwards, is smooth, with the exception of a radial groove, to act as a spout for the discharge of the flour; that part of the face of the runner corresponding with this being provided with lands, about eight in number, and inclined the reverse of those on the other portions of the face. It is also proposed, under another patent, to dress the stones in curved lines, instead of straight; and to make the eye of the runner conical; and to connect the bridge-tree (on which the runner rests) and the mouth of the hopper with a centrifugal governor; so that when the velocity of the runner is increased beyond a certain range, the feeding is reduced, and the runner elevated, to reduce the pressure on the grain.

One among the objections which have been advanced against that class of grinding mills in which the grinding surface is cylindrical, is the difficulty of setting the grinding surfaces for grinding coarse or fine; for one of the surfaces being a semi-cylindrical concave, as this is drawn from the cylinder, the separation is much greater in the middle of the concave than at the top and bottom. To avoid this difficulty, a patent has been granted for setting or regulating the grinding surfaces by rotating the concave about an imaginary centre, eccentric to the axis of the grinding cylinder; by means of which, the whole of the concave is equally separated from the cylinder.

Two patents have been granted for improvements in mills for grinding corn with the cobs, by an arrangement of cutters to cut the cobs into slices preparatory to the action of the teeth. In one of these there is a knife attached to, and moving with the spindle, and four attached to the bed stone, and projecting within the eye, at equal distances apart, and arranged tangentally to a circle smaller than the eye of the millstone; the mill running horizontally. And in the other, which runs vertically, the corn and cobs

are fed in through a hole in the fixed grinder, about midway between the centre and the periphery, which is provided with a bed cutter; there being two corresponding cutters on the runner, and the faces of both grinders, being provided with teeth, to divide the slices formed by the cutters preparatory to the grinding. These patents are limited to modifications of a mill previously patented for cutting and grinding.

It is a matter of great importance to have the runner of a mill work very true; for, without this, good flour cannot be obtained; and, therefore, much attention has been given to the construction of the bush of the bed stone through which the spindle passes, so as to insure this end, and prevent the wear by keeping it properly oiled, without the necessity of removing the runner, and, when worn, to tighten the bush and retain the central position of the spindle. Within the last year, two patents have been added to the large number before granted. One of them is for adjusting the bush.

"The bush is made in wedge-formed segments, with a rod extending down from each segment, and passing through and being secured to a plate below, by means of nuts above and below, for the purpose of adjusting each segment separately; and, for the adjustment of the whole together, this plate is suspended, by means of seven rods and nuts, from the box of the bush."

And the other is for adjusting and oiling. At the bottom of the bush case there are two thick leather washers, which are kept tight around the spindle by means of a large screw nut, through which it passes, and the oil is supplied from a reservoir within the nut.

Bolting flour.—It is proved by experience that the flour sometimes adheres to the rotating bolter; and to prevent this, long beaters are jointed to the arms, which, in vibrating from one set of arms to the other, jar the bolter, and prevent the flour from adhering.

Bark mills.—With the view to increase the grinding surface of these mills, and to insure a better action, a patent has been granted for forming the mill of several concentric rings, connected together by means of radial bars—at the top, for the fixed or bed grinder; and at the bottom, for the runner. The concentric rings of the runner work between those of the fixed or bed grinder; the teeth being formed on the inner and outer peripheries of the rings, and the upper edges armed with cutters, to cut the bark into large pieces before the grinders begin to act.

Governors for regulating the velocity of machinery.—Under a patent lately granted, it is proposed to substitute for the governors now generally employed, inclined or spiral vanes on a vertical shaft, working within a vessel containing water or other fluid. This shaft is capable of sliding up and down in its bearings, and is connected with any piece of machinery to be regulated in the usual manner. From this arrangement, it must be evident that an increased velocity of the shaft will cause the vanes to meet with an increased resistance in passing through the water, and by their inclination to rise, and thus reduce the velocity of the moving parts, and *vice versa*.

Horse-powers for driving machinery.—Several patents have been granted for modifications of the moving parts of these machines, with the view of condensing the whole into a smaller compass, to prevent the cog wheels and other parts from breaking and from other accidents, and to reduce the cost of constructing them; all of which are important, when we

consider how extensively these machines are used in every part of the country, and particularly amongst the farmers, with whom first cost and durability are essential considerations.

8.—MACHINERY FOR MANUFACTURING AND WORKING LUMBER

Saw mills.—As a means of dispensing with the weight of the saw gate in saw mils, which is considered objectionable, the saw has been attached to a sliding block at top and bottom, and therefore depending upon its stiffness, instead of the tension given to it by screws when applied in a gate. To combine the advantages of both methods, a patent has been granted for "straining" the saw, (as it is termed in technical language,) without the use of a gate, by attaching a piston to each slide; the two pistons working in appropriate cylinders connected together by a steam pipe, so as to use the elastic force of steam to strain the saw. The elastic force of the steam does not impede the motion, as it is equal on both pistons, and therefore balanced.

The difficulty of making circular saws of sufficient diameter to cut through large logs was attempted to be remedied some years ago, by using two saws, one above the other, each cutting half way through the log. As an alleged improvement on this, a patent has been granted for using several saws, above and below; each succeeding one being of greater diameter, so as to make the entire cut by a series of cuts, instead of a single or double one.

Several patents have been granted for various modes of arranging the head and tail blocks of saw mills, to render them self-setting. The great variety of devices for this purpose, which have been patented and are in public use, is matter of astonishment, and is evidence of the great resources of mechanical ingenuity. Some of those patented during the past year are for so connecting the slides of the head and tail blocks, on which the log rests, as to move both ends of the log by the same operation, and yet enable the two blocks to be moved nearer to or farther from each other, for logs of different lengths; others, for arrangements of parts for lifting the log vertically, that the slides, on which it rests during nearly the whole operation, may be moved the required distance on a set of inclined planes so located and arranged that, when the log is again permitted to rest on them, its weight will cause the whole to slide the required distance for the thickness of a plank. And, again, others are for modes of setting the tail end of the log by a slow gradual motion, (the length of the log admitting of this;) and the head end by liberating a weight connected with a lever and auxiliary parts, by which the desired effect is produced the moment the saw runs out of the log. These are the general characteristics; but the other arrangements, covered by other patents, could not be made clear without drawings.

Making shingles and clapboards.—Improvements in this class of machines have also been patented during the past year. One of them is for arrangements of the parts of the machinery for moving the carriage to present the block to the action of a circular saw, and to shift the position of the block at the end of each operation, and preparatory to a new cut; this arrangement being simply a modification of the method heretofore employed for these purposes. Two others are for improvements applied to that class of machines in which the shingles are cut by means of a re-

ciprocating cutter attached to and moving with a sliding gate; and are for modifications of the mode of feeding or presenting the block to the action of the cutter in such manner as to cut the butt alternately from opposite ends of the blocks. And in another, the cutters are attached to the periphery of a hollow cylinder, connected with the shaft by means of arms. The throat of the cutter, through which the shingle, when cut, passes, is made in the cylinder; so that the shingle is discharged inside of the cylinder, there being a curved guide to carry it out at the end of the cylinder, between the arms.

Making staves, and other parts of barrels, &c.—Several patents have been granted for improvements in this branch of industry. In one of these machines, the staves are cut, by means of reciprocating cutters, from blocks of wood previously steamed to prevent cracking, in manner varying but very little from machines previously known, but by which the operation will be facilitated; and the heads are formed with both bevels at the same time, by means of sections of saws attached to the periphery and face of a mandrel, the heading being presented to this instrument in an inclined position, and turned by the hand of the attendant, so as to present every part of the circumference in succession. In another, the staves, after being prepared in the usual way, are bent and held together at the ends by two circular plates and two mandrels, and turned off by means of a cutter, which moves from end to end in a curve corresponding with the bilge of the barrel; after being thus turned, it is put into a hollow chuck, and the crose and howel turned. Two machines have also been patented for splitting and shaving hoop poles, which are presented to the edge of the splitting and shaving knives by means of rollers so arranged and connected as to enable the pole to yield in any direction, and present the knife to follow the grain of the wood.

Lathes for turning wood, &c.—A patent has been granted for a modification of Blanchard's well-known machine for turning irregular forms, in which the pattern and the piece of wood to be turned are put upon opposite sides of a rocking frame, and the pattern and cutter wheel on a carriage that has but one motion from end to end. On the cutter carriage there is a rocking shaft, with a pattern wheel on one end, and a burr cutter on the other, to smooth or finish the work.

Another patent has also been granted for another modification of this machine of Blanchard's, to adapt it to the turning of oars and similar work. The pattern in this machine is made in two parts—the handle and the blade; the former, which is round, being permanent, and the other turning; and to the carriage, which carries the pattern and cutter wheel, there is attached, by a movable catch, another that carries a rest or support for the oar, which, on account of its great length, cannot be turned without; and as this rest or support cannot be carried along the blade or irregular part of the oar at the proper time, the two carriages are disconnected, and the cutter carriage moves on to the end, whilst the rest remains at the end of the handle or round part.

A very ingenious machine has been patented for turning or forming scythe snaths. The cutters are connected with the inner periphery of a wheel, in such manner as to be moved towards and from the centre, as the piece of wood, previously bent to the proper curve, is introduced and carried through, and its direction changed to correspond with the curvature.

Patents have also been granted for modifications of machines, before

known, for turning spools, whip handles, and other articles. By an arrangement of rotating cutters and circular saws, lately patented, it is proposed to make boxes for matches. Other patents have also been granted for minor improvements in machines for cutting match splints, mortising and boring wood, and other operations connected with the working of lumber, which, not possessing any distinctive character, cannot be noticed here.

9.—FIRE ARMS AND IMPLEMENTS OF WAR.

But three patents have been granted in this class: two of them for modifications of previously known modes of loading small arms at the breech, by making the rear part or breech of the barrel separate. In one of them, this separate section turns on a pin parallel with the axis of the bore, and at the side; so that, by turning on this pin, the section can be lifted up, charged, and let down again. And in the other, that end of the movable section which unites with the main portion of the barrel lifts up, as in Hall's rifle; the patent being granted for an arrangement of parts to throw it up and down, and to insure its retention in line with the bore when down.

The third patent is for an alleged improvement in the mode of making large wrought-iron guns, by means of a series of rings or hoops, screwed into each other, to form the inner periphery or bore, over which another series of rings are screwed, breaking joints with the first; and, in this manner, adding a third, fourth, or any other number, to increase the thickness.

Several applications for patents were made, during the past year, for making this class of guns, by means of staves and hoops, or rings, which were rejected for the want of novelty; this mode having been the first adopted when cannons were first made, and finally abandoned as worthless. It is to be regretted that those who have applied their minds and means to make improvements in the construction of large guns of wrought iron have not first acquainted themselves with the properties of iron, and the various changes which it undergoes whilst under the action of the fire and hammer; for there is probably no branch of the arts that requires more experience and judgment, aided by science, than the working of iron, particularly when applied to ordnance; and yet persons wholly unacquainted with the subject undertake to dictate to men of experience and science.

10.—MISCELLANEOUS.

The sweeping of streets by machinery has, for a few years past, attracted much attention by its importance as a sanative question; and several machines for this purpose have been patented and reduced to practice in this country and in Europe. During the past year, another patent was granted for one which appears to have much merit. It consists of a set of curved brooms, that are moved around a shaft horizontally, and carr the dirt to one side of the street, and then rise up to deposite it in windrows. The mechanism of the moving parts is ingenious and simple, and not liable to be deranged. I have seen a full size operative machine, and have no doubt that it will succeed to the satisfaction of the ingenious inventor.

Several other patents have been granted for miscellaneous articles, such

as traps for the catching of animals, modes of furling and unfurling awnings for shielding dwellings from the action of the sun, and arrangements of nets for catching fish.

I have thus presented to your consideration a rapid sketch of the chief characteristics of the inventions made, or rather brought to maturity, during the past year. This mass of ingenuity, presented to the world in the short space of twelve months, would, to the student of antiquity, appear marvellous—nay, fabulous; but not so to the student of modern progress, whose mind has been schooled to the rapid progress of the useful under the inductive system.

It is a matter of surprise that society at large, which has been and must continue to be so much benefited by inventions and the progress of the useful arts, should pay so little attention to this subject. The fruits of the labors of nventors are enjoyed and recognised by the world at large, but the authors of all these benefits pass through the world unnoticed, and in most cases unrewarded. It is to be regretted that literary men do not turn their attention to the progress of the useful, and, with the pen of fancy, add ornament and beauty to the solid edifice.

The preceding sketch presents a striking fact worthy of consideration. The branches of the arts which have been in a prosperous condition during the past two years (as, for instance, cotton manufactures) have received a smaller number of contributions from inventors than those which have been in a depressed state, (as civil engineering.) This state of things corresponds with a striking fact which I have long since observed. The master spirits, looking through the present to the future, have made their great leading inventions in all countries, and in all ages, especially with a view to force a change in the condition of society; while secondary minds have adapted their labors to the demands of the existing state of things—the one leading, the other following. But the American character seems to be an exception to this general rule; and whether this be the effect of our institutions, of our vast extent of territory, or of both, is difficult to decide; but that such is the fact, must be evident to all. Improvements in the other countries keep pace with the general state of things; they rise with prosperity, and sink with adversity; whilst, here, it is the converse of the proposition. There, they seem to be the effects of prosperity; and here, the causes. So closely has this been observed, that, without any other source of information, the condition of the various branches of industry could be ascertained from the archives of the Patent Office.

All of which is respectfully submitted.

CHARLES M. KELLER,
Examiner of Patents.

Hon. H. L. Ellsworth,
Commissioner of Patents.

G.

Report of Charles G. Page, Examiner, &c.

PATENT OFFICE, *January*, 1845.

SIR: In conformity with your requisition, I have the honor, herewith, to submit a brief review of the progress of the arts and sciences, as far as they are embraced under the subjects allotted to me for examination, during the past year.

Since the commencement of the year 1844, I have reported to you the results of my examinations upon 644 applications for patents; 309 of this number have been patented in whole or in part, and the remaining 335 rejected.

There are 22 classes or divisions of applications for patents; each class comprehending subdivisions, amounting, in many of the classes, to upwards of 20.

Twelve of the 22 classes are assigned to my supervision, and are as follows, viz:

1st. Agriculture, including instruments and operations.

2d. Chemical processes, manufactures, and compounds, including medicines, dyeing, color making, distilling, soap and candle making, mortars, cement, &c.

3d. Calorific; comprising lamps, fireplaces, stoves, grates, furnaces for heating buildings, cooking apparatus, preparations for fuel, &c.

4th. Mathematical, philosophical, and optical instruments, clocks, chronometers, &c.

5th. Hydraulics and pneumatics; including water wheels, windmills, and other implements operated on by air or water, or employed in the raising and delivery of fluids.

6th. Lever, screw, and other mechanical powers, as applied to pressing, weighing, raising, and moving weights.

7th. Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cement, and other building materials.

8th. Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness, &c.

9th. Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing, &c.

10th. Arts, (polite,) fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry, &c.

11th. Surgical and medical instruments, including trusses, dental instruments, bathing apparatus, &c.

12th. Wearing apparel, articles for the toilet, &c., including instruments for manufacturing.

AGRICULTURE—69 PATENTS GRANTED.

The large number of patents granted for applications pertaining to this class may be taken as fair ground for the deduction that the subject is still one of great growing interest, and is at present engrossing a very large share of the inventive talent of our country. In the short space of one year, it could hardly be expected that any important revolution, any signal discovery, or many really useful inventions, should be made in a pursuit claiming, above all others, the right of primogeniture. Advances, nevertheless, are constantly being made in this branch of indus-

try. Every year it is acquiring fresh laurels and a higher reputation for itself. The "sweat of the brow" is not now the mainspring of its operations, the grand key to its success; nor the open field the sole theatre of experiment. The closet, the laboratory of the chemist, are its nurses. The most exalted intellects are becoming farmers, as it were, in the retiracy of their studies. Science, both chemical and physical, have become the palladium of agriculture. Since the publication of Liebig's valuable work on the chemistry of agriculture, we must date a new era in this science. It has, at least, received a fresh impulse from his labors; and its publication in this country, in newspaper form, for the low price of 25 cents, (when the ordinary bookstore price has been $1 50,) will aid greatly in disseminating knowledge, so essential to farming interests. The use of guano* as a manure has long been known in remote parts of the world, and this substance has been employed for many years to fertilize the barren soils on the coast of Peru; but it does not seem to have elicited attention, other than as a matter of curiosity, from the most enlightened agricultural portions of the world, until after the appearance of Liebig's work. The announcement that it was only necessary to add a small quantity of guano to a soil which consists of nothing but sand and clay, to procure the richest crop of maize, was sufficient to awaken an interest in the farmer, and excite the cupidity of the merchant. No writer has dwelt so much on the importance of nitrogen as a manure, as Liebig; and it is this feature, in part, which constitutes the grand novelty and value of his work. In the above-quoted assertion, where guano is added to clay and sand, we suppose not a trace of organic matter in the soil; and yet, by the addition of a manure, consisting chiefly of urate, phosphate, carbonate, and oxalate of ammonia salts, all containing nitrogen, we have the richest crops of maize. The husbanding of substances containing nitrogen, and attention to the proper methods for its fixation, will soon become objects of paramount importance with the farmer.

Ploughs.—Several important improvements have been made in this instrument during the past year; but they are chiefly for modes of fastening and so fitting the points and shares, that, in case of wear or injury, they can be easily replaced by the farmer himself. It is a question, perhaps, yet to be decided, whether cast iron ploughs are more economical to the farmer than the ploughs with cast iron mould boards and wrought shares and points. In the latter, the mould board is liable to be broken, and, if so, can hardly be replaced; but, as the share and point are the parts most liable to injury, if these are wrought iron, and fastened in a simple and firm manner, the farmer who is in the neighborhood of an ordinary blacksmith, or may have one upon his establishment, can easily repair the damage, which, in the case of the cast iron plough, he could not do without sending to the manufacturer or the foundry for a new casting. This

*Guano is the putrid excrement of sea birds, and is obtained in large quantities from islands in the Pacific ocean, which are visited by immense flocks of these birds during their breeding season. The islands are covered to the depth of several feet with this material, and are now visited by large numbers of ships from various parts of the world; and, within a few months, several large cargoes have been brought into our principal ports, and met with a ready sale. Among some interesting facts connected with this new species of trade, we see it stated that, while digging the guano, the body of a man has been disinterred, and found in an excellent state of preservation; and that eggs are frequently found in a good condition, which must have been buried for years. If true, these facts must call up some entirely new principle in chemical science; for, according to Liebig's doctrine of *eremacausis*, and even common experience, one would hardly look upon putrescent excrement as a preservative of animal tissues.

objection to the cast iron plough is now, in a great measure, obviated by many dealers, who are in the practice of putting up with each plough, for a slight extra expense, two or more extra points and shares. Few ploughs have been patented during the past year. Several applications have been made for patents for the substitution of steel for cast or wrought iron in ploughs, and rejected upon the well-established ground that the mere substitution of one well-known material for another is not the subject of a patent. Several cultivators and combined ploughs for light soils have been patented; but nothing of definite value can be predicated upon this class of inventions. An ingenious instrument for digging potatoes has been the subject of a patent, and, though it may fail to do all it professes, is certainly an approximation to an invention very much needed. This operation is one of vast labor; and a cheap labor-saving machine, which, in case of very large crops, should leave one-tenth, or even a larger proportion of the crop in the ground, would be a welcome invention.

A promising improvement has been made in the grain cradle, by making the teeth of hollow metal, filling them up with wood sufficiently far to insure strength. The teeth glide very easily through the grain, and are not liable to the objection of warping and sticking where the grain is wet, as is the case with wooden teeth.

A simple and effective instrument for gathering fruit from trees has been patented, by which the ladder may be generally dispensed with, and the trees and fruit saved from injury.

Some important improvements have been made in smut machines, and in machines for hulling seeds.

The wheat fan, or winnowing machine, has been of late much improved by the use of the spiral fan in the place of the old flutter-wheel fan; and, although the introduction of the spiral fan is not recent, yet it has, during the past year, been introduced under such modifications as to render the instrument very serviceable. In connexion with this instrument also, an interesting and useful feature has been secured by patent, consisting of a mode of so operating the screens or sieves as to give just that motion which is imparted to them when they are used in the hand.

Bee hives.—A growing interest is evident in this branch of agriculture, and a large number of applications have been received. Seven of them have been patented, and a greater number rejected. Most of the alleged improvements have claimed to be remedies against the bee moth, the pest of the apiarian. As bee culture increases, the bee moth seems to become more numerous and troublesome, and should therefore be vigorously met by vigilance and ingenuity. In this latitude, it requires every attention to save the bees from this their great enemy; and so formidable has it become from numbers, that the same devices which may, perhaps, be found to give protection further north, will not apply here.

Nothing yet seems to be of any value, except placing the hives upon the ground—the hives being made very tight, and the entrance of the bees being as low as possible.

CHEMISTRY—27 PATENTS GRANTED.

One of the most interesting applications in this branch during the past year, is one for silvering looking glasses, for which letters patent have been granted. The invention consists in the substitution of a coating of silver for quicksilver in the preparation of glass mirrors. It has been pub-

licly announced that the Rothschilds had offered £100,000 for the suppression of this discovery; but the enormity of the amount, and the proverbial intelligence of that house, preclude the credence of the credulous to such a report. It has been for some time known that aldehyde (which, in chemistry, means alcohol minus hydrogen) possessed the property of precipitating silver from its oxides in metallic form by the aid of heat; and that a glass tube—such, for instance, as a test tube—might be coated with silver on its inner surface, by heating in it, over a spirit lamp, certain salts of silver in conjunction with aldehyde. Such a process would, of course, be inapplicable to mirrors; but the patentee has invented means of effecting the perfect reduction of the silver by aldehyde, without the aid of heat. The most important result of this discovery will be found in its bearing upon the health of those concerned in the manufacture of looking glasses.

By the usual process of amalgamation, such quantities of mercury are used as to render the occupation extremely unhealthy—an evil entirely remedied by the new process. The coating is even said to surpass in reflecting power that usually employed, although this seems rather improbable. No specimens have yet been received at this office, although they have been represented as of great beauty.

In the old process for silvering, or rather coating mirrors, an amalgam of tin and mercury is laid upon the surface of clear plate glass; and this amalgam, when freed from the mercury by pressure, constitutes the reflecting surface. The extensive use of mercury in this operation renders it extremely unhealthy; and the coating thus formed is liable to be defaced by chemical changes, as is frequently witnessed in the spots occurring upon the backs of mirrors. It is contended that the new invention obviates these difficulties. The process for coating the glass with silver is substantially as follows: The glass is carefully cleaned, laid upon a table, and a rim of wax, or some suitable substance, raised around its borders. A solution of silver is then poured upon the glass, a little ammonia added, and, from time to time, a little oil of cassia and alcohol; after which, oil of cloves is added, when precipitation commences, and a pure and firm coating of silver is formed upon the glass, which is afterwards carefully dried and protected from injury.

India-rubber fabrics.—The great value of caoutchouc in the arts has led to a great variety of devices to overcome those difficulties experienced on its first introduction, viz: a speedy mode of dissolving, and a speedy mode of drying the solution. No solvent has ever been obtained better than the caoutchoucine, a liquor prepared by the destructive distillation of the caoutchouc itself; but the great expense of the solvent precludes its introduction at present, and turpentine is generally used as the most economical solvent. A great difficulty has hitherto been experienced in drying the rubber when turpentine was the solvent; but this seems now to be entirely overcome, and chiefly by the aid of sulphur. Unfortunately for this invention, the greater part of the fabrics prepared of India rubber are for wearing apparel; and the smell of the sulphur, which is retained for an indefinite time, is a serious objection to their common use. As a subject of special interest, and one which has made great advances during the past year, we may cite the invention for manufacturing corrugated or shirred India-rubber fabrics. By this is understood that species of goods or fabric which is now in extensive use for suspenders, and all kinds of straps where elasticity is a desirable property. The invention mainly consists

in stretching threads of India rubber to their utmost tension, or nearly so, and enclosing these threads between two layers of cloth of any kind, as taste may dictate; the layers of cloth are made to adhere firmly to the threads by means of India rubber cement, the whole being passed between heavy rollers, to secure a perfect union. As soon as the fabric has become firm and dry, the India rubber threads are allowed to contract, which draws the cloth into wrinkles; and hence the name of corrugated or shirred goods. The material thus prepared serves a great variety of purposes—is made into shoes or slippers, and is introduced in every part of wearing apparel. The threads of India rubber have also been *woven* into loose fabrics, producing a better article than the foregoing, though at present more expensive. Caoutchouc, or India rubber, may be regarded as a highly valuable gift to man, and it is sincerely hoped that the culture of the tree yielding this substance may succeed in the southern portions of our country. From it are made many valuable surgical instruments: it makes the life-preserver for the mariner, the gas-holder for the chemist, affords protection to the invalid and delicate in health, enters largely into the composition of valuable varnishes, paves the stables of royalty, serves as roofing to buildings, and a vast variety of purposes both of comfort and economy.

Sal æratus.—This article, so useful to the housekeeper in the making of bread, sweetening of milk, accelerating the churning of cream, &c., is usually made by forcing an extra quantity of carbonic acid gas into the carbonate of potassa. One of the common modes of doing this, is to suspend the carbonate of potassa in suitable vessels over the fermenting liquor in distilleries and breweries. The process of fermentation fills the vats with an atmosphere of carbonic acid gas, which, combining with the carbonate, gives us the super-carbonate of potassa, or sal æratus. Owing to the abandonment of the business by a large number of distillers, a considerable source of the supply of this article is cut off; and the inventor proposes, as a substitute, to impregnate the salt by means of the carbonic acid from a common anthracite coal fire.

Salt making.—Two patents have been granted for improvements in this process; in both of which the brine is heated at the surface, instead of the usual mode of applying heat at the bottom of the kettle. It is a well-known feature in crystallization, that rest or quiet among the particles of a solution insures the formation of large and pure crystals. The agitation consequent upon heating a liquid at its lowest portion interferes with the regular formation of crystals, and the salt is deposited in crude and irregular masses. In one of the two last-mentioned patents, the heat is applied over the surface of the brine by means of tubes conveying steam; in the other, ingenious contrivances are resorted to for lowering or raising these tubes, according to the height of the surface of the liquid. Evaporation must of course proceed very slowly in these operations; but if purity of the salt is desired, it is thus attained.

Sugar.—Very important improvements have been introduced in sugar making, and some inventions patented during the year 1843 have been put to the test during the past year. And if reports which have come casually to this office are true, they must be of great value to the inventors, and of the highest importance to the Southern portions of our country. The improvements are three fold—being in the economy of fuel, evaporating the sirups, and granulation of the sugar. Important improvements have also been made in the modes of filtration. In one of these, the sirup, or, in-

deed, any liquid to be filtered, is run into the centre of a cylinder filled with pulverized charcoal, or other filtering material; the cylinder being kept in rapid revolution, the liquor is forced through perforations on its outer surface by centrifugal action. The experiments with the corn-stalk sugar have been prosecuted with promising success, and it is likely to become a profitable occupation.

Lard.—The separation of the two proximate constituents of lard, viz: elaine and stearine, or, in common phraseology, lard oil and candle-stuff, has been for several years an object of pursuit, and is now accomplished in a very perfect manner. The chemical processes described in my last report for separating these substances seem to have been in a great measure superseded by mechanical agency; pressure, when applied in a certain manner, being found fully to answer the purpose. The most valuable improvement, and one for which a patent has been granted, is the application of pressure to the solid tissues containing fat, before they have been burned (or, rather, overheated) in the process of trying out, as it is called. The lard and oil produced in this way are purer, sweeter, keep much better in the warm climates, and are rendered in large quantities. A foreign patent has been granted for purifying oils, particularly for soap oils, by forcing air through them when in a heated state.

Lampblack.—A mode of making lampblack has been patented; which, it is asserted, produces a much larger quantity from a given weight of resin than the old method, in which the smoke from the burning resin was carried through long chimneys, and condensed upon bags or mats—that portion of the smoke passing out of the chimney which would have made the finest carbon or lampblack. In the new process, the smoke is received in a very large apartment and condensed upon the walls and floor, from which it is brushed off when sufficiently accumulated. The apartment is made tight, and without ventilation; and the calculation is so made, that the amount of oxygen in the air of the room will be more than sufficient to consume all the resin which is put into the furnace. As soon as one burning is over, and the smoke all condensed, the windows are opened, a fresh supply of air admitted, and the operation again repeated.

Music.—The Æolian piano, which is a combination of the instrument well known as the accordion with the piano forte, has attracted much attention, and, if reports are true, the inventor is reaping a rich reward. Attempts were made many years ago to effect this combination, but without success. The inventor has so arranged the operating parts of the two instruments, that the piano-forte movement is not at all interfered with in operating the accordion. The action of the piano and accordion are made simultaneous, at the will of the performer, by a very simple contrivance. The instruments are well adapted for situations where injuries, very likely to happen to the accordion, are easily repaired; and where the proprietor or performer is enabled to tune the piano by the accordion—the pitch of which is not so apt to change under the influences of moisture, changes of temperature, and frequent use, as the strings of the piano. The piano has, for several years past, been very much improved, particularly in the touch or movement, and by the introduction of cast metal frames to sustain the strings; giving greater stability of pitch and improved tones. The piano may, perhaps, take rank next to the violin, as a musical instrument affording opportunity for the exercise of taste and skill; but genius is not

satisfied with the piano as it is, and is bent upon increasing its capabilities to suit the diversities of taste, and place it at the head of the list as an instrument of versatile powers. Within a few days, a patent has been granted for a mode of producing the harmonic tones upon the piano, by connecting with a pedal an apparatus which shall make a slight pressure upon the middle of the string: thus giving the harmonic octave. The pressure is made to imitate, as nearly as possible, that of the finger in producing these exquisite tones upon other stringed instruments. Pressure upon other nodes of the strings would of course produce harmonic tones; but the inventor is satisfied with the harmonic octaves. A patent has been granted for the combination of the glassichord with the piano; and in the same connexion an improvement has been made in the tones of the glassichord itself, by a more elastic mode of suspending the strips of glass than has been before used.

CALORIFIC—54 PATENTS GRANTED.

Many of the patents under this class are of a useful purport; but the subject has been run so threadbare, from the immense number of patents hitherto granted, that but little chance is left for the display of genius. In regard to stoves, there is much diversity of opinion as to their comparative economy; and the domestic regulation of families, and their peculiar and distinct wants, growing out of difference of circumstances, requiring so many varieties in this article of furniture, that the number of models of this invention far exceeds any other in the office. To the casual observer the inspection of this class in the model room might appear as offering promise of a patent for every change of form that could be devised, and a precedent for the same liberality of action in every other class of inventions; but, from the nature of the invention, the patentable features are, in a large majority of cases, out of sight, and within the stove. A large number of applications for patents for stoves have been rejected, as presenting nothing more than mere changes of form.

Fireplaces.—A patent has been granted for a peculiar construction of fireplace, in which the inventor proposes to obviate the smoking by so constructing the chimney, in building the house, that a current of air, brought from out of doors, descends in a sheet the entire length of the arch of the fireplace, and comes down obliquely forward, in front of the fire. A patent has also been granted for a mode of curing smoky chimneys; the substance of which consists in dropping the back of the fireplace about six inches below the arch, and enlarging the throat above the arch. The inventor contends that neither of these features alone would cure the defect; but their combination is essential to the result.

Several improvements have been made in the construction of lamps, for preventing the overflowing and leakage of oil about the cap and wick tube—a serious inconvenience with all hand lamps. The foundation of the several improvements is found in a patent granted for an oil feeder, in which the same evil was obviated. The improvement seems to be of little avail in the glass hand lamps, as they are very apt to leak at the junction of the metallic cap and the body of the lamp. Whether the leakage is here owing to the permeability of the cement by oil, or to carelessness in cementing the cap to the lamp, the manufacturers can best decide; but certain it is, that a large majority of the glass lamps offered for sale—even those

provided with the improved cap—are unfit for delicate fingers to handle. The improvement consists mainly in providing a cap of considerable capacity, about the base of the wick tubes, to catch the oil that flows over by the capillary action of the wick; but, as oil finds its way so readily between metallic surfaces, even when pressed very tightly together, it becomes necessary to provide against the leakage between the threads of the screw, by which the cap is fitted to the lamp. This has been effected by placing the cap with its screw entirely within the cup for catching the waste oil. At the bottom of the cup is a small hole, serving to supply the lamp with air, and return to the lamp any oil caught by the cup. In metallic lamps, there being no other joint than this within the cup, the remedy is perfect; but the improvement will be of no avail in glass lamps, until some means are devised of securing the caps to the glass to prevent leakage.

Under the head of *calorific*, has been included a patent for a reflector for light-houses; though, strictly speaking, it is an optical instrument. The mirror is of plated copper, struck up in the usual parabolic form, and covered with thin glass, conforming in shape to the mirror. Silver exposed to the air in almost any situation soon tarnishes, principally from the action of sulphur; but when exposed to sea air blackens very rapidly, from the action of the chlorine of the sea water. Consequently, silvered mirrors in light-houses require frequent cleaning; and, from the coarse materials employed usually in such places, they soon become defaced and worn out. The advantages promised from the improvement are: 1st, that the silvered surface of the mirror, being entirely protected from the air, is always bright, and is thus saved from injury and wear by rubbing; and, 2d, that, from this circumstance, the amount of silver used in plating may be much diminished, so as even to admit of galvanic plating.

Some patents have been granted for lard lamps; but thus far no hand lamps have been found to burn lard well, without some contrivance for keeping the lard near the top of the wick. The complication of such contrivances, and their liability to get out of order, render such lamps too expensive. The devices for conducting the heat of the flame downwards into the lard are still resorted to; though it is entirely nugatory to bring a conducting body into the flame for this purpose, as the shadow cast by the conductor, and its refrigerating effect upon the flame, render such lamps useless.

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*The art of *electrotyping* has not been before the office as the subject of application for a patent; but several specimens of silver plating upon iron work for harness show a highly improved condition of the art of plating by the galvanic method. The art promises to be ultimately of great value, though considerable difficulty has hitherto been experienced in laying on the precious metals to such a degree of thickness as to prevent acids and corroding solutions from getting at the inferior metal underneath. The moment this takes place, the whole work is rapidly destroyed, the acid working under, and entirely removing the deposite of gold or silver, and acting with greater energy upon the inferior metal, from the fact that it is in contact

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* Continued from class of chemisty, page 513.

with a metal of an opposite electrical character, which forms a galvanic series, and facilitates the attack upon the most oxidizable metal. This art, sometimes called the galvanoplastic art, has been abused by the vicious for the purposes of counterfeiting the precious metals; but there can be no truth in the prevailing opinion that bank notes have been counterfeited by the aid of this art, in conjunction with the Daguerreotype process. It is supposed that a bank note is first copied by the Daguerreotype of the normal size of the note; and the plate upon which the copy is thus taken is etched by chemical action, and thus made to produce *fac similes* of the original. The difficulties in the way of such a procedure are seemingly insuperable, and are as follows:

Firstly. No arrangement of lenses ever known can produce an image perfect in all its detail and proportions of the normal size of the object.

Secondly. No process of etching a Daguerreotype impression has ever been devised to produce engravings equally perfect with the original.

Thirdly. Bank note engraving is the most difficult of all kinds to imitate from the minuteness of detail; and, lastly, as the ink required to produce a tolerable impression from an etched Daguerreotype must be of a peculiar kind and color, there would be extreme difficulty in producing an imitation passable even with the most ignorant. The first difficulty mentioned would alone be sufficient to quiet all fears upon this subject. The only danger to be apprehended is from electrotype copies, the process of procuring which was described in my last report; but if the original engraved plate is well guarded, no evil can arise from this source.

Cements, pigments, &c.—A number of applications have been rejected, and several patented, for water-proof pigments and cements. The basis of most of them is one of the products of the destructive distillation of the coal in the gas works—usually the naphtha in combination with the tar. These pigments are very useful in cases where insects are troublesome, as the odor of the naphtha is very noxious to almost all the insect tribe.

Sealing wax.—A patent has been granted for combining with small sticks of sealing-wax a composition which would ignite the wax by friction, saving the trouble of procuring a lamp to assist in sealing letters.

Presses.—Much emulation has been displayed in this branch, particularly in presses for cotton; and many of them have given evidence of great mechanical ingenuity, though it is feared the complexity of some of the most beautiful presses will operate against their introduction. The great difficulty with most of the cotton presses has been a want of strength; but, among the presses patented during the past year, it is believed that this condition has been answered, without rendering the presses too cumbrous and slow of action. Attempts have been made to use the direct action of steam upon a piston to move the platen of the press, but without success. A patent has, however, been granted within a few days for a steam cotton press, which appears to do away with the difficulties found in all previous attempts. Devices have also been resorted to, for accommodating the platen of the presses to bales of different sizes. For instance; when more cotton than is sufficient to make a bale of a given size should happen to be put into the press, the attempt to bring such a quantity to the usual size might strain or break the press; to guard against which, when the pressure reaches the amount of force for which the press is graduated, the platen gives back, and saves the press. Several ingenious self-acting presses, principally for pressing cheese, have been patented.

Printing.—This art, of the highest importance to man, though brought, as we presume, to a high degree of cultivation, is receiving every year such extraordinary accessions, that we are half inclined to place it in its earliest stage.

Stereotyping has, during the last fifteen years, made scarcely any advance upon its original condition; but, during the past year, a very important improvement has been made in casting and finishing the type blocks, by which a very large number of plates may be cast at once—and that, too, without marring a single block. One principal feature consists in placing the moulds vertically, instead of the old mode of placing them in a horizontal position; and there are other important improvements in finishing the blocks, by planing and chiseling machines—an operation heretofore performed by the use of hand tools. But the most striking improvement in this art is one made in Germany, and just announced in the public prints—of making the stereotype blocks of iron, instead of the usual type metal. If stereotype plates can be made of cast iron, as stated, we must hail the invention as one of the most valuable of the age, as it will reduce the price of books to a very little above the cost of the material. It has been stated that, by means of the improvement, the whole Bible has been printed for about 25 cents. No official authentication can be given of the above; but we are not much surprised at the announcement, knowing the wonderful perfection of Prussian and German iron-casting.

Two signal improvements in printing presses have been patented during the year—in one of which there are six pressing cylinders revolving about an axis, the cylinders being furnished with an ingenious arrangement of fingers, which seize the sheets of paper, carry them round and over the bed, perform the pressure, and deliver the sheets in a rapid and beautiful manner. The press requires four attendants, and delivers the sheets as fast as they can be fed in by the four. The other press is for printing the sheets on both sides, which it does before they are delivered, by an admirable and very compact arrangement of the machinery. Perfect operating models of both the last-named inventions were deposited in the office, affording ocular proof of their success.

Books.—Every thing tending to lessen the price of books must be looked upon as of the utmost consequence to mankind at large; and though the improvements in printing share the highest honors in the glorious work of disseminating knowledge, and carry the means of information to the doors of even the most indigent, yet it has its handmaid in paper-making, and its hundreds of auxiliaries in other branches of science and art. Of paper-making, the records of the office show nothing special, though intelligence has been received of the highest promise of success, from an invention reported last year, viz: making paper from the cane, growing so abundantly in the Southern portions of our country.

An important improvement has been patented for making the backs of books, which must contribute considerably to abate their expense. The forming of the backs of books has heretofore been the slow work of the hands; but, by the invention before us, the book is passed through a machine which forms the back at once, and in a durable and perfect manner. It is effected mainly by the pressure of a roller, having upon its periphery a concave surface, adapted to the convexity of the back of the book.

I have thus taken a brief view of such inventions patented during the past year as have borne, upon their front, features of striking novelty, the

semblance of utility, and the promise of success, irrespective of my own humble judgment. A large number of patents have undoubtedly been secured, which will eventually be of value to the inventors and the public; but, as time must prove them, nothing could be given but a mere synoptical table; and I have endeavored to avoid any expression of opinions bearing prospectively upon patented inventions, but have rather repeated the promises and hopes of inventors, and added such animadversions as were derived from truths too palpable to escape notice. The character of the inventions presented during the past year has sustained the reputation of our nation for genius, enterprise, and search after the useful. The yearly increase of applications points clearly to the illimitable nature of our duties, and the future magnitude of your department. Each novel and notable invention seems to introduce a family of congeners, and gather early around itself a numerous offspring. No sooner was a novel feature introduced in presses during the last year, than four applications for improvements upon the same were made during the space of two months. No sooner were the Croton water-works in operation, than genius was called upon to facilitate the introduction of the invaluable privilege, and expedite the enterprise; and a large number of applications have been made for inventions specially applicable to this purpose.

Hundreds of such instances might be cited, but it would be a work of supererogation to show the interminable progression of science and art. The increase of man's wants is commensurate with the enlargement of the field of knowledge—not such actual want or privation as is characterized in the aphorism, "necessity is the mother of invention," but something far happier, and more ennobling—the want or desire of those means which shall gratify his thirst for knowledge, and place him in a higher sphere. It is true we might, in running over the annals of invention, reverse, in many cases, the adage, and pronounce invention to be rather the mother of necessity, and tell of the unmerited fate of many a poor inventor; but, still, with all our sympathy for him, there is yet this encouragement to offer to others—that, in a large number of cases, genius meets with its true reward; and to it mankind will be ever indebted, though they may sometimes forget or withhold remuneration.

Respectfully submitted.

CHAS. G. PAGE.
Examiner of Patents.

Hon. H. L. Ellsworth,
Commissioner of Patents.

TABLE OF CONTENTS.

N.—*Classified list of patents granted during the year 1844, with the names of patentees, places of residence, and date of patent.*

CLASS I.—AGRICULTURE, INCLUDING INSTRUMENTS AND OPERATIONS.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Bee hives	Aaron E. James	Point Pleasant, Va.	January 6, 1844.
Bee hives	Samuel & J. D. Cope	Damascusville, Ohio	February 12, 1844.
Bee hives	George B. West	Fairfield, Ohio	April 20, 1844.
Bee hives	James A. Cutting	Haverhill, N. H.	June 24, 1844.
Bee hives	Jacob D. Fulkerson	Unity, Ohio	July 1, 1844.
Bee hives	Oliver Reynolds	Webster, N. Y.	December 4, 1844.
Bee palaces	Lemon Hamlin	Kirkersville, Ohio	July 13, 1844.
Churn	George W. Cook	St. Louis, Mo.	February 28, 1844.
Churn	Harmess Bentley	Ballston, N. Y.	April 20, 1844.
Churn	Jason B. Schermerhorn	New York	June 5, 1844.
Churn	Thomas Ling	Portland, Me.	August 21, 1844.
Corn and cane cutters	Jacob Peck	Oakland, Penn.	August 28, 1844.
Corn fodder, cutting and crushing	Rudolph Miller	York, Penn	October 3, 1844.
Corn sheller	William McAll	Talladega, Ia.	April 13, 1844.
Cultivator	Robert Nelson	West Point, Ia.	January 15, 1844.
Cultivator	William Dyzert	Gettysburg, Penn.	August 16, 1844.
Cultivator teeth	James Birdsell	Hamorton, Penn.	November 9, 1844.
Fruit gatherer	Alexander McWilliams	Washington, D. C.	March 13, 1844.
Harrow, sward-cutting	Dennis Rice	Rowe, Mass.	May 17, 1844.
Hulling clover machines	A. B. Crawford	Wooster, Ohio	December 31, 1844.
Hulling and pearling rice	Jacob Groat	Troy, N. Y.	July 11, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Mowing, grain cradles	William A. Wood & John C. Loveland	Hoosick Falls, N. Y.	November 13, 1844; antedated Nov. 9, 1844.
Mowing, harvesting machines	George Esterly	Heart Prairie, W. T.	October 22, 1844.
Mowing, hemp cradles	Griffin Reynolds, jr.	Washington, Ky.	May 30, 1844.
Mowing, reaping machines	William F. Ketchum	Buffalo, N. Y.	November 18, 1844.
Plough	John Thompson	Ripley, Ohio	April 17, 1844.
Plough	Aaron Smith	Bloomfield, Mich.	May 6, 1844.
Plough	Jonathan Mooers	Hazleton, Penn.	July 1, 1844.
Plough	Anthony Taylor	New Garden, Ohio	December 19, 1844.
Plough, adjusting	William K. Allan	Brownston, Ky.	January 31, 1844.
Plough, combined	Harvey Brown	Payson, Ill.	March 9, 1844.
Plough, double	Aaron Smith	Bloomfield, Mich.	May 10, 1844.
Plough, excavating ditches	James Herbert	Lagrange, Ia.	April 13, 1844.
Plough, gathering weeds under the furrow slice	Dudley Hills	East Hartford, Conn.	October 7, 1844.
Plough, wheel	Israel Long	Bucyrus, Ohio	March 9, 1844.
Potato diggers	Archibald C. Ketchum	Schenectady, N. Y.	February 20, 1844.
Rake, grain	Benoni F. Partridge	Onondaga, N. Y.	March 13, 1844.
Rattoon and cane cutters	Norbert Lauve	Plaquemines, La.	September 17, 1844.
Seeding, corn planters	Thomas H. Hoskings	Crawfordsville, Ia.	January 20, 1844.
Seeding, planting machines	Dierck Breuer	Petersburg, Tenn.	April 4, 1844.
Seeding, seed planters	Loea Pratt	Amherst, N. H.	April 25, 1844.
Seeding, seed planters	Richard J. Gatling	Murfreesborough, N. C.	May 10, 1844.

Seeding, seed planters	W. Kilburn and F. Haines	Lawrenceville, Marietta, Penn.	December 31, 1844.
Seeding, sowing machines	Ezra Fisk	Fayette, Me.	November 18, 1844.
Smut machine	Meredith Mallory	Mount Morris, N. Y.	January 20, 1844.
Smut machine	Jacob W. Brower	Mount Airy, N. C.	February 28, 1844.
Smut machine	James M. Clarke	Strasburg, Penn.	March 20, 1844.
Smut machine	Samuel Scammon and R. Nason	Waterville, Me.	April 10, 1844.
Smut machine	Elisha S. Snyder	Charleston, Va.	April 30, 1844.
Smut machine	Henry B. James	Mount Holly, N. J.	May 17, 1844.
Smut machine	Abraham Straub	Milton, Penn.	May 17, 1844.
Smut machine	Elisha W. Young and Thomas H. Nelson	Parkman, Ohio; Harrisburg, Penn.	June 5, 1844.
Smut machine	James W. Webster	Luray, Va.	June 5, 1844.
Smut machine	John Pagin	Michigan City, Ia.	August 14, 1844.
Smut machine	Jacob Groat	Troy, N. Y.	November 9, 1844.
Straw cutter	William Hovey	Worcester, Mass.	February 12, 1844.
Straw cutter	Hiram M. Smith	Richmond, Va.	February 20, 1844.
Straw cutter	Eliakim Taylor	Rochester, N. Y.	October 12, 1844.
Straw cutter	Ezra Taylor	Monroe, N. Y.	November 6, 1844.
Threshing machine	Luther & Ezra Whitman	Winthrop, Me.	March 20, 1844.
Threshing machine	Charles W. Cathcart	New Durham, Ind.	April 25, 1844.
Threshing machine	Frederick A. Stuart	Catharine, N. Y.	June 5, 1844.
Threshing and winnowing machine, &c., grain separaters	Jacob V. A. Wemple and George Westinghouse	Mohawk, Schoharie, N. Y.	July 13, 1844.
Winnowing, fanning mill, for cleaning grain	Calvin O. Guernsey	Russia, N. Y.	October 12, 1844.
Winnowing machine	Thomas Cole and John Littlefield	Allensville, Ind.	August 7, 1844.
Winnowing machine	Thomas Chandler and Asa D. Reed	Rockville, Ill., Miles, Mich.,	December 7, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Winnowing, separating grain from straw	Manning Packard and Christopher B. Packard	Clarendon, N. Y.	November 18, 1844.
Winnowing, wheat fans	David Watkins	Port Republic, Va.	February 2, 1844.
Winnowing, wheat fans	William Stanley	Jamestown, N. C.	November 18, 1844.
CLASS II.—METALLURGY, AND MANUFACTURES OF METALS AND INSTRUMENTS THEREFOR.			
Anvils, machine for making	John Taylor	Shadegap, Penn.	January 31, 1844.
Bolt in door fastenings, mode of operating	Albert Bingham	Boston, Mass.	June 5, 1844.
Buckles	Julius W. Hatch	Manlius, N. Y.	February 20, 1844.
Buckles	Isaac B. Verplank	Mentz, N. Y.	March 9, 1844.
Buckles	Henry Lawrence	Manlius, N. Y.	July 13, 1844.
Buckles. (See *Class* 21.)			
Cutlery, cleaning and polishing	William Vine	New York, N. Y.	February 28, 1844.
Curry comb	Thomas Wilkinson	Cambridge, N. Y.	August 16, 1844.
Drill or borer, governing the feed of	John B. Grout	Birmingham, Mich.	May 30, 1844.
Drilling machines	Amos Morgan	Wooster, Ohio	May 30, 1844.
Forges, blacksmiths'	Frederick A. Stuart	Catharine, N. Y.	July 1, 1844.
Furnace, reverberatory, for smelting or puddling iron	William Green, assignee of S. Broadmeadow	Woodbridge, N. J.	January 6, 1844.
Furnace for smelting iron	Leman Bradley	Sharon, Ct.	November 18, 1844.
Hinges, butt blanks, machinery for trimming	Cyrus Kenney	Troy, N. Y.	July 26, 1844.

Hinges, butt, moulds for - - - -	Benjamin F. Harley and John D. Morris -	Philadelphia, Penn. -	February 12, 1844.
Hinges, butt, planing and dressing the knuckles on their inner sides - -	Gage Stickney - -	Blackwoodtown, N. J. -	December 19, 1844.
Hinges, butt, wrought iron, bending the knuckles of - - - -	Cyrus Kenney - -	Troy, N. Y. - -	August 23, 1844.
Hinges, butt, wrought iron, machinery for making - - - - -	Cyrus Kenney - -	Troy, N. Y. - -	August 7, 1844.
Hinges, flask for moulding - - -	Thomas Loring - -	Gloucester, N. J. -	February 7, 1844.
Iron and copper, coating with tin and other metals - - - - -	Edmund P. Morewood -	Great Britain, now in New York - -	September 17, 1844.
Iron or other ores, process of reducing to the metallic state, by coating them with certain fluxes - - - - -	Jonas Tower - -	Madison, Ohio -	December 7, 1844.
Iron and steel, process of manufacturing -	Thomas Southall and Charles Crudgington -	Kidderminster, Eng. -	February 8, 1844, England; Sept. 14, 1844, U. S. A.
Iron, wrought, from the ore, mode of obtaining	Simeon Broadmeadow -	New York - -	May 30, 1844.
Labels for mail bags - - - -	Oren S. North - -	New Britain, Conn. -	March 13, 1844.
Latch, mortise for doors - - -	William Wilson - -	Northampton, Mass. -	November 26, 1844.
Laths, metallic, for fire-proof ceilings of houses	Palmer Summer - -	New York, N. Y. -	April 25, 1844.
Lock, door - - - - -	Linus Yale - -	Springfield, Mass. -	June 13, 1844.
Lock, door, bank, safes, &c. - - -	Marcus R. Stephenson and Oliver Edwards -	Boston, Mass. - -	April 17, 1844.
Lock, door, bank, safes, &c. - - -	Marcus R. Stephenson and Oliver Edwards -	Boston, Mass. - -	July 9, 1844.
Lock, door, combination - - -	Sabin Colton - -	Philadelphia, Penn. -	January 6, 1844.
Lock, door, combination - - -	Marcus R. Stephenson and Oliver Edwards -	Boston, Mass. - -	April 17, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Lock, door, combination	Robert Newell	New York, N. Y.	September 17, 1844.
Lock, door, permutation, for vaults, safes, &c.	Darius W. Maples	Geneva, N. Y	December 4, 1844.
Metal, manufacture of	Arthur Wall	Poplar Blackwall, Great Britain	November 18, 1843, England; August 10, 1844, U. S. A.
Metal, method of making patterns for casting hollow ware, &c.	Ezra Ripley	Troy, N. Y.	August 31, 1844.
Nail-cutting machine, feeder for	Caleb Isbister	Allegheny, Penn.	December 31, 1844.
Ores, washing, apparatus for, separating, or dressing	Nicholas Troughton	Swansea, England	July 23, 1842, England; July 22, 1844, U. S. A.
Pins, arranging, and sticking into paper	De Grasse Fowler	North Bradford, Conn.	September 20, 1844.
Pipes, lead, machinery for manufacture of	Charles Sellers and George E. Sellers	Cincinnati, Ohio	March 9, 1844.
Plates, door	J. H. Grout and Fowler M. Ray	New York	March 20, 1844.
Plates, door, and signs, of separate types, &c., method of making	Edmund Morris	Philadelphia, Penn.	April 25, 1844.
Spike machines	Samuel G. Reynolds	Bristol, R. I.	July 26, 1844.
Steel, manufacture of	Simeon Broadmeadow	New York	May 25, 1844.
Vessels of soft metal, method of making	John Rand	Citizen United States, now in Great Britain	August 7, 1844.

CLASS III.—MANUFACTURES OF FIBROUS AND TEXTILE SUBSTANCES, INCLUDING MACHINES FOR PREPARING FIBRES OF WOOL, COTTON, SILK, FUR, PAPER, ETC.

Braid, Tuscan, &c., weaving	Elisha Fitzgerald	New York	October 16, 1844.
Bonnet, portable	Thomas Hammond	New York	October 30, 1844.
Bonnet tips, pressing, apparatus for	Thomas Kendall	New York	September 3, 1844.
Carding machine, self-stripping card for carding fibrous substances	H. Barbour & J. Gleason	Lowell, Mass.	December 4, 1844.
Cloth, brushing and winding	Reuben C. Varnel	West Somers, N. Y.	March 13, 1844.
Cloth, folding and measuring, machinery for	Silas C. Durgin	North Chelmsford, Mass.	March 9, 1844.
Cotton, wool, &c., burring and cleaning	Silas G. Mumford	North Providence, R. I.	March 28, 1844.
Fabrics. (See *Class 22—India rubber.*)			
Gin, cotton, in the roller	Richard Reynolds, jr.	Beaufort, S. C.	February 2, 1844.
Gin, cotton, saw gin for ginning cotton	Eleazer Carver	Bridgewater, Mass.	April 4, 1844.
Gin, cotton, saw gin for ginning cotton	John H. Sherard	Livingston, Ala.	April 30, 1844.
Hats and bonnets, machine for pressing	Caleb Merritt	Baltimore, Md.	March 13, 1844.
Hats, manufacture of	John Maguire	Washington, D. C.	December 7, 1844.
Hemp breaker and cleaner	Constant B. Butler	Petersburg, Tenn.	January 6, 1844.
Hemp and flax brake	Aaron F. Bruce	Marshall P. O., Mo.	June 24, 1844.
Hemp, &c., heckling and spinning	William Montgomery	Boston, Mass.	February 20, 1844.
Hemp, &c., preparing and spinning, (reissue)	Moses Day	Roxbury, Mass.	April 3, 1840; reissued March 13, 1844.
Knitting. (See *Loom.*)			
Loom, fish nets	J. Carr, J. Shannon, and William Carr	Sunbury, Penn.	September 14, 1844.
Loom, knitting	Richard Walker and Jefferson McIntire	Portsmouth, N. H.	February 12, 1844.
Loom, knitting	Pierre E. Ladrange	Vignory, kingdom of France.	June 1, 1843. France; Oct. 16, 1844, U. S. A.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844.—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Loom, power	James Nield	Taunton, Mass.	May 25, 1844.
Loom, regulating the delivery of the warp from the warp beam	William H. Brayton	Warren, R. I.	January 6, 1844.
Loom, rotary temples for	Isaac C. Lane	Waltham, Mass	March 26, 1844.
Paper, sand, glass, or emery	Edmund Morris	Philadelphia, Penn.	September 14, 1844.
Ropes, machinery for laying	S. & Jas. A. Bazin	Canton, Mass.	February 28, 1844.
Silk reels	James S. Harris	Poultney, Vt.	July 30, 1844.
Spinning, bobbins, method of operating in machinery for spinning fibrous substances	Francis McCully, jr.	Paterson, N. J.	October 30, 1844.
Spinning, flier and dead spindle for	Phineas Stevens	Nashua, N. H.	April 20, 1844.
Spinning, hook spinner and twister, whirling and rotary	John Thorp	North Wrentham, Mass.	September 27, 1844.
Wool, combing	George E. Donisthorpe	Bradford, England	November 25, 1843, England; Sept. 11, 1844, U. S. A.
Wool, combing	Ezra Gould	Paterson, N. J.	October 9, 1844.

CLASS IV.—CHEMICAL PROCESSES, MANUFACTURES, AND COMPOUNDS, INCLUDING MEDICINES, DYEING, COLOR-MAKING, DISTILLING, SOAP AND CANDLE MAKING, MORTARS, CEMENTS, ETC.

Cements, making	William H. Smith	Georgetown, D. C.	June 10, 1844.
Cements and pigments, water-proof	Edward Deutsch	France	October 8, 1842, Eng.; May 25, 1844, U. S. A.

Coloring and hardening wood	Charles F. Spicker	New York	June 24, 1844.
Composition for aqueduct pipes	Gideon Myers	Bridgewater, N. Y.	March 28, 1844.
Composition for dyeing the hair	Auguste Grandjean	New York	February 28, 1844.
Composition for glazing	Ths. and Ephraim Parker	Orangeville, Pa.	February 20, 1844.
Composition for making brick	Nathaniel J. Wyeth	Cambridge, Mass.	March 28, 1844.
Composition, water-proof, for leather	William J. Roome	New York	January 6, 1844.
Dyeing yarn, machinery for	Amoskeag Manufacturing Company, assignee of William A. Burke	Manchester, N. H.	May 30, 1844.
Friction matches	Elisha Smith	Erving, Mass.	October 3, 1844.
India rubber. (See *Class* 22.)			
Lampblack, making	John G. Mini	Philadelphia, Pa.	November 13, 1844.
Lard, preparing	H. A. Amelung	Alton, Ill.	November 13, 1844.
Lard, rendering	Ebenezer Wilson	Cincinnati, Ohio	October 9, 1844.
Mash tubs	Benjamin Roop	Pekin, Ohio	May 6, 1844.
Ointments, mercurial, machines for making	James W. W. Gordon	Baltimore, Md.	June 5, 1844.
Ointments for piles	William W. Riley	Mansfield, Ohio	January 31, 1844.
Paints, fire and water proof	Joseph Weisman	Philadelphia, Pa.	February 20, 1844.
Sal æratus, making	Edward Chamberlain	Boston, Mass.	September 7, 1844.
Salt, making	Isaac Noyes	Kanawha Saline, Va.	April 25, 1844.
Sealing wax, igniting	Joseph Fatman	Philadelphia, Pa.	April 17, 1844.
Silvering looking glasses	Thomas Drayton	Brighton, England	November 25, 1843, England; August 12, 1844, U. S. A.
Soap and oils, purifying	Arthur Dunn	Rotherhithe, England	November 9, 1843, England; Dec. 4, 1844, U. S. A.
Sugar boilers	Abraham Hager	Donaldsonville, La.	March 9, 1844.
Sugar candy	Henry and Geo. Garrison	Newburgh, N. Y.	April 10, 1844.
Sugar, cleaning	Joseph Hurd	Stoneham, Mass.	October 3, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Sugar, &c., filters for	John Watson	Lancaster, England, now in Elizabethtown, New Jersey	June 23, 1842, England; January 31, 1844, U. S A.
Tallow, &c., cutting	Zabina Ellis	Kingston, Pa.	October 12, 1844.
Tobacco, renovating	Enoch Huse	Newburyport, Mass.	July 22, 1844.
CLASS V.—CALORIFIC, COMPRISING LAMPS, FIREPLACES, STOVES, GRATES, FURNACES FOR HEATING BUILDINGS, COOKING APPARATUS, PREPARATION OF FUEL, ETC.			
Chimneys, building, to prevent smoking	Joseph Gilbert	Frease's P. O., Ohio	November 13, 1844.
Chimneys, caps for regulating draught of	Joseph Hurd	Stoneham, Mass.	December 12, 1844.
Coal, breaking	Joseph Battin	Philadelphia, Pa.	February 12, 1844.
Fire fenders	Morgan Morgan, jr.	New York, N. Y.	July 22, 1844.
Fireplaces	Daniel Hemingway	Leesburg, Ky.	November 9, 1844.
Furnaces, air-heating	Jephtha Bradley	St. Albans, Vt.	June 24, 1844.
Furnaces, grate bars of	John Kymer	Caermarthen, South Wales, England	July 19, 1844.
Furnaces, heating buildings	George Walker	New Haven, Ct.	June 10, 1844.
Furnaces, portable	George E. Waring	Stamford, Ct.	March 16, 1844.
Lamp	Henry B. Fernald	Boston, Mass.	May 17, 1844.
Lamp, a,cohol, for medicated vapor bath	Giles L. F. Griswold, assignee of L. E. Hicks	Middletown, Ct.	March 16, 1844; antedated December 15, 1843.

Lamp caps	Francis Draper	East Cambridge, Mass.	March 20, 1844.
Lamp caps	D. Jarves and New England Glass Co., assignees of R. H. Eddy	Boston, Mass.	May 10, 1844.
Lamp, construction of	Christopher West	Baltimore, Md.	October 7, 1844.
Lamp, lard	John Tobin	Bloomfield, N. J.	March 26, 1844.
Lamp, light-house	Winslow Lewis, sen. Benjamin Hemmenway	Boston, Mass. Roxbury, Mass.	August 7, 1844.
Lamp, self-supplying	Edwin B. Horn	Boston, Mass.	September 11, 1844.
Lamp, volatile ingredients, burning	Isaiah Jennings	New York, N. Y.	October 12, 1844.
Lamp wicks, raising	Samuel Rust	New York, N. Y.	March 9, 1844; antedated January 29, 1844.
Oil feeders	Joseph Benson	Boston, Mass.	February 28, 1844.
Ranges, cooking	Herbert H. Stimpson	Boston, Mass.	May 17, 1844.
Ranges, kitchen	Ambrose W. Thompson	Philadelphia, Pa.	March 20, 1844.
Ranges, kitchen	Julius Fink	Philadelphia, Pa.	April 10, 1844.
Reflectors, metallic	Alonzo Farrar	Boston, Mass.	April 4, 1844.
Stoves, air-heating and cooking	John Woolley	Springfield, Mass.	March 16, 1844.
Stoves, air-tight	John Cline	Norwalk, Ohio	January 6, 1844.
Stoves, air-tight, self regulating	Harned & Elliott, assignees of Saxton & Elliott	Philadelphia, Pa.	October 30, 1844.
Stoves, apparatus for regulating the heat of	Samuel D. Tillman	Seneca Falls, N. Y.	April 17, 1844.
Stoves, cooking	James Young and Elmon Parker	Philadelphia, Pa.	February 12, 1844.
Stoves, cooking	Jordon L. Mott	New York	February 12, 1844; antedated December 1, 1843.
Stoves, cooking	Simon Pettes	Schenectady, N. Y.	February 12, 1844.
Stoves, cooking	S. S. Jones	Philadelphia, Pa.	February 20, 1844.
Stoves, cooking	Ashley Hotchkin	Maryland, N. J.	February 20, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Stoves, cooking	Samuel Bentz	Boonsborough, Md.	March 9, 1844.
Stoves, cooking	Roswell Bush	Rochester, N. Y.	April 4, 1844.
Stoves, cooking	Abner Leland	Milton, Penn.	April 4, 1844.
Stoves, cooking	Friedrick Kesselmeier	Wooster, Ohio	April 13, 1844.
Stoves, cooking	Peter Mills	Binghampton, N. Y.	April 30, 1844.
Stoves, cooking	Isaac Straub	Cincinnati, Ohio	June 5, 1844.
Stoves, cooking	William & R. P. Resor, assignees of Thomas Bent	Cincinnati, Ohio	June 5, 1844.
Stoves, cooking	James White	Milton, Penn.	June 10, 1844.
Stoves, cooking	Calvin Fulton	Rochester, N. Y.	June 10, 1844.
Stoves, cooking	John C. Hermance	Schenectady, N. Y.	June 13, 1844; antedated June 7, 1844.
Stoves, cooking	Henry W. Camp	Oswego, N. Y.	June 24, 1844.
Stoves, cooking	James Wager	Troy, N. Y.	July 9, 1844.
Stoves, cooking	James Lewis	Amsterdam, N. Y.	September 20, 1844.
Stoves, cooking	John W. Riggs	Fort Plain, N. Y.	October 30, 1844.
Stoves, cooking	James H. Lyon	Schenectady, N. Y.	November 18, 1844.
Stoves, cooking	Adam Ketler	Philadelphia, Penn.	December 7, 1844.
Stoves, cooking	Archibald Wieting	Middletown, Penn.	December 16, 1844.
Stoves, cooking	William L. Potter	Clifton Park, N. Y.	December 19, 1844.
Stoves, cooking and heating	Laommi Bailey	Boston, Mass.	March 26, 1844.
Stoves, cooking, railway	Chollar, Jones, & Low, assignees of Chollar & Parmelee	West Troy, N. Y.	July 11, 1844.

Stove, or heating apparatus	John Smart	Philadelphia, Penn.	March 28, 1844.
Warming buildings, apparatus for	Benjamin Blaney	Boston, Mass.	September 7, 1844.

CLASS VI—STEAM AND GAS ENGINES, INCLUDING BOILERS AND FURNACES THEREFOR, AND PARTS THEREOF.

Boiler, steam, or generating apparatus	Gabriel H. Moreau	France	January 26, 1844.
Boiler, steam, heater of, &c.	Zenas C. Robbins	St. Louis, Mo.	October 16, 1844.
Boiler, steam, regulating the supply of water to	Daniel Barnum	Bridgeport, Conn.	July 24, 1844.
Furnace of steam boilers	Leman Bradley	Sharon, Conn.	December 12, 1844.
Gas-light apparatus	James Crutchett	Great Britain; now in Cincinnati, Ohio	July 12, 1842, England. May 6, 1844, U. S. A.
Gas or vapor engine, inflammable	Stuart Perry	Newport, N. Y.	May 23, 1844.
Steam engine, auxiliary, constructing and governing, for the purpose of supplying a steam boiler with water	Henry R. Worthington	New York	July 24, 1844.
Steam engine, auxiliary, constructing and governing, for the purpose of supplying a steam boiler	Henry R. Worthington	New York	July 24, 1844; reissued September 7, 1844.
Steam engine, condenser and boilers of	Benjamin Crawford	Allegheny city, Penn.	September 7, 1844.
Steam engine, conical balance valves	Thomas McDonough	Middletown, Conn.	February 12, 1844.
Steam engine, conical seat, steam valves	Sprague Barber	New York	April 20, 1844.
Steam engine, locomotive	Edwin F. Johnson	New York	December 31, 1844.
Steam engine, opening and closing the valves of	Frederick E. Sickels	New York	October 19, 1844.
Steam engine and other boilers, supplying air to consume the combustible gases, &c., that escape from the furnaces	Peter Robinson	Waterloo, N. Y.	April 20, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Steam engine, rotary	Abram Pease	Lyons, N. Y.	February 12, 1844.
Steam engine, rotary	Matthew Fletcher	London, England	November 18, 1844, (date of English patent not determined.)
Steam engine, rotary, exhausting the case of	Edward Locke	Newport, England	September 11, 1844.
Steam engine, valves, method of connecting the action of the cut-off	Barnabas H. Bartol	Coldspring, N. Y.	September 20, 1844; antedated March 20, 1844.
Steam engine, vibrating	Ebenezer A. Lester	Boston, Mass.	February 7, 1844.

CLASS VII.—NAVIGATION AND MARITIME IMPLEMENTS, COMPRISING ALL VESSELS FOR CONVEYANCE ON WATER, THEIR CONSTRUCTION, RIGGING, AND PROPULSION, DIVING DRESSES, LIFE PRESERVERS, ETC.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Harpoon	Albert Moor	Hampden, Me.	March 16, 1844.
Ice breaker for boats and other vessels	Samuel Nicholson	Boston, Mass.	July 16, 1844.
Life preserver	Adoniram Chandler	New York	October 3, 1844.
Life preserver, applicable as buoys, rafts, &c.	Jos. Francis, assignee of C. Aug. de Liancourt	New York France	November 10, 1844, France; May 10, 1844, U. S. A.
Propelling boats, &c., oblique paddle propeller	Ralph Bulkley	New York	March 13, 1844.
Propelling canal and other boats	Henry R. Worthington	New York	February 2, 1844.

Propelling, paddle wheels, horizontal	Ephm. Buck, assignee of Peter Lear	Boston, Mass.	February 20, 1844.
Propelling, paddle wheels, of steamboats, &c.	Richard D. Chatterton	Derby, England	January 11, 1842, England; July 24, 1844, U. S. A.
Propelling, propeller, rotary inclined, for vessels	Richard F. Loper	Philadelphia, Penn.	February 28, 1844.
Propelling, propeller, submerged	Peter Von Schmidt	Washington, D. C.	May 30, 1844.
Propelling, propeller, submerged, coupling the shafts of, for steamboats, &c.	Richard F. Loper	Philadelphia, Penn.	October 9, 1844.
Propelling ships	John Ericsson	New York	December 31, 1844.
Propelling steamboats and other boats	Gabriel H. Moreau	France	January 26, 1844.
Rigging blocks of ships	Stephen Waterman and Isaac D. Russell	Greenwich, Conn. New York	January 31, 1844.
Rigging, forming and rigging the sails of square-rigged vessels	Warren C. Choate	Washington, D. C.	April 17, 1844.
Ships, cellars, &c., mode of calking	William Bennet	New York	April 20, 1844.
Ships and other vessels, strengthening the sails of	Archibald Trail	Great Britain	February 24, 1844, England; Sept. 24, 1844, U. S. A.

CLASS VIII.—MATHEMATICAL, PHILOSOPHICAL, AND OPTICAL INSTRUMENTS, INCLUDING CLOCKS, CHRONOMETERS, ETC.

Chronometer escapements	Oramel W. Waste	Pittsford, N. Y.	September 24, 1844.
Clock pendulums	Frederick Kesselmeier	Wooster, Ohio	April 10, 1844.
Interest, machine for calculating	Jehu Hatfield	Glenfalls, N. Y.	May 6, 1844.
Rules or measures for boards, leather, &c.	Charles Ross	Piqua, Ohio	May 17, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

CLASS IX.—CIVIL ENGINEERING AND ARCHITECTURE, COMPRISING WORKS ON RAIL AND COMMON ROADS, BRIDGES, CANALS, WHARVES, DOCKS, RIVERS, DAMS, AND OTHER INTERNAL IMPROVEMENTS, BUILDINGS, ROOFS, ETC.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Bridges, truss frames of	Otis W. Pratt Caleb Pratt	Norwich, Conn. Boston, Mass.	April 4, 1844.
Canals, lock gates, suspending, opening, and closing	Henry McCarty	Pittsburg, Penn.	March 16, 1844.
Dock, floating dry, basin to be used in connexion with a	R. Moody and Samuel D. Dakin	New York	September 17, 1844.
Doors, sliding	William T. Forsyth	Philadelphia, Penn.	February 12, 1844.
Excavating, cutting trenches for laying pipe	Ezra Cornell	Ithaca, N. Y.	February 28, 1844.
Excavating, ditching machines	Edwin Owen	Laporte, Ia.	September 4, 1844; antedated March 24, 1844.
Excavating, excavator or drag for removing mud, &c., in beds of rivers	Dennis Vermillion	Washington, D. C.	November 9, 1844.
Excavating, excavator scoop and dredging machine	Joseph Smith	Mansfield, Ohio	August 24, 1844.
Excavating, scrapes for repairing roads, &c.	Samuel G. Sutton	Yorkshire, N. Y.	May 30, 1844.
Railroad, connecting cast-iron rail for	James M. Bay	Harrisburg, Penn.	April 13, 1844.
Railroad, key for fastening the rails of, to their chairs	Benjamin Butterfield	Kensington, Penn.	August 21, 1844.
Railroads, safety switch for	Gustavus A. Nicholls	Reading, Penn.	December 19, 1844.

Railroad truck frames	Davenport & Bridges, assignees of Charles Davenport	Cambridgeport, Mass.	August 10, 1844.
Roofs of houses, &c., manner of making	John Woolley	Springfield, Mass.	March 26, 1844; antedated March 16, 1844.
Roofs of houses, &c., securing tin plate, &c., on	Peter Naylor	New York, N. Y.	April 25, 1844.
Streets, machine for sweeping	Alexander M. Wilson	Rossville, N. Y.	October 16, 1844.
Telegraph, signal	Henry I. Rogers	Baltimore, Md.	September 27, 1844.

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CLASS X.—LAND CONVEYANCE, COMPRISING CARRIAGES, CARS, AND OTHER VEHICLES USED ON ROADS, AND PARTS THEREOF.

Car, railroad, locomotive, &c., coupling bars of	William D. Chesnut	Wilmington, Del.	February 20, 1844.
Car, railroad, turning curves	John H. Quail	Philadelphia, Pa.	February 25, 1844.
Car, railroad, to prevent accidents from what are called "snake heads"	Elisha Tolles	New York, N. Y.	February 20, 1844.
Carriage bodies, connecting with the pearch by means of springs	George Nichols	Trumbull, Ct.	April 10, 1844.
Carriage bodies, &c., hanging	John Reynolds	Newberry, Pa.	July 9, 1844.
Carriage, detaching horses from	John Madden	Warren, Ohio	July 9, 1844.
Carriage, disengaging horses from	James S. Shnell	Shiremanstown, Pa.	April 13, 1844.
Carriage, wagons, &c., couplings for	George W. Hatch	Parkman, Ohio	June 13, 1844.
Journals, preventing from heating.* (See *Class* 13.)			
Journals of railroad cars, constructing the bearings and oil boxes, &c.; additional improvement, dated July 1, 1844	John H. Tims	Newark, N. J.	October 31, 1839; Reissued June 13, 1844.
Spring brace for carriages	Erastus T. Sprout	Dimock, Pa.	September 7, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Wheels, carriage, wrought iron	James McCullum	Wilsonville, Ala.	May 10, 1844.
Wheels, cast iron railroad	Ebenezer A. Lester	Boston, Mass.	August 10, 1844.
Wheel hub, lining metallic boxes for	Moses Palmer	Baltimore, Md.	March 9, 1844.

CLASS XI.—HYDRAULICS AND PNEUMATICS, INCLUDING WATER WHEELS, WINDMILLS, AND OTHER IMPLEMENTS OPERATED ON BY AIR OR WATER, OR EMPLOYED IN RAISING AND DELIVERY OF FLUIDS.

Aerostats, or balloons, &c., directing	Muzio Muzzi	Bologna, Italy	May 12, 1844, France; October 16, 1844, U. S. A.
Engine, fire	Gardner Barton, jr.	Waterford, N. Y.	August 16, 1844.
Hydro-pneumatic apparatus for raising beer, &c., from casks	Richard Sealy	New York, N. Y.	August 31, 1844.
Pipes, supply for aqueducts, construction of	John H. Thorndike	Boston, Mass.	July 1, 1844.
Pipes. (See *Class* 2.)			
Pumps	T. Jefferson Wolfe	Baltimore, Md.	April 10, 1844.
Water and animal power	John A. Wiszt	Philadelphia, Pa.	May 10, 1844.
Water, regulating the supply of	John Cochrane	Newark, N. J.	July 13, 1844.
Water wheel	Hiram Ferguson	Richland, N. Y.	March 20, 1844.
Water wheel	Nelson Johnson	Rathboneville, N. Y.	March 26, 1844.
Water wheel	Albert Stimpson	Rockingham, Vt.	April 25, 1844.
Water wheel	Daniel Weaver	McKeansburg, Pa.	June 10, 1844.
Water wheel	David Putney	Redbank, Pa.	August 12, 1844.

Water wheel	Roswell Cook	Elkland, Pa.	September 14, 1844.
Water wheel	J. D. Robinson	Peoria, Ill.	October 24, 1844.
Water wheel	Samuel L. Valentine	Bangor, Me.	December 12, 1844.
Water wheel	Theodore R. Timby	Cato Four Corners, N. Y.	September 27, 1844.
Water wheel, combined	Emerson G. Covel	Glenn's Falls, N. Y.	February 20, 1844.
Water wheel, current	John Carnagy	Tully, Mo.	April 10, 1844.
Wind wheel, horizontal	Daniel Dennett	Centreville, La.	November 13, 1844.

CLASS XII.—LEVER, SCREW, AND OTHER MECHANICAL POWER, AS APPLIED TO PRESSING, WEIGHING, RAISING, AND MOVING WEIGHTS.

Balance	George R. Moore	Brattleborough, Vt.	January 6, 1844.
Balance cranes	Claudius Gignoux, assignee of Louis Henry	New York, N. Y. Paris, France	October 27, 1842, France; Nov. 9, 1844, U. S. A.
Balance, spring	James H. and R. H. Bull	New York, N. Y.	September 20, 1844.
Press, brick. (See *Class* 15.)			
Press, cheese, self-acting	John Martin, jr.	Aztalan, W. T.	November 26, 1844.
Press, cotton	Seth Lamb	New York	March 16, 1844.
Press, cotton	Perry G. Gardiner	New York	March 20, 1844.
Press, cotton	William Sewell, jr.	Macon, Penn.	June 15, 1844.
Press, cotton	George Peck	Fairfield, Conn.	March 9, 1844.
Press, cotton	William F. Provost	Barnwell district, S. C.	September 14, 1844.
Press, cotton	Jedediah Prescott	Memphis, Tenn.	November 9, 1844.
Press, cotton	Peter M. Wright	New York	November 26, 1844.
Press, hay	Charles F. Paine	Winslow, Me.	April 25, 1844.
Press, hay, cotton, &c.	S. W. Bullock	Williamsburg, N. Y.	March 3, 1842; re-issued August 14, 1844.
Press, printing. (See *Class* 18.)			

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Presses - - - - -	Amos Jackson - -	Liberty, Ill. - -	June 24, 1844.
Pressing, lever powers for - - -	Robert Sanderson -	Athens, Ohio - -	February 20, 1844.
Pressing, machines for preparing tobacco for	David Smith - -	South Hill, Va. -	January 15, 1844.
Pressing and raising weights, machines for -	Smith Cram - -	New York - -	March 9, 1844.
CLASS XIII.—GRINDING MILLS AND MILL GEARING, CONTAINING GRAIN MILLS, MECHANICAL MOVEMENTS, HORSE POWER, ETC.			
Bark mill for grinding tanners' bark - -	Mather Beecher - -	Remsen, N. Y. -	September 27, 1844.
Bolts for bolting flour - - -	Ryburn Buchanan -	Sullivan county, Tenn.	July 24, 1844.
Grinding corn and cobs, mill for - -	Samuel L. Starr - -	Mexico, Penn. - -	April 4, 1844.
Grinding grain, cylindrical mill for - -	Jacob Groat - -	Troy, N. Y. - -	July 11, 1844.
Grinding grain, mills for - -	Eli B. Nichols and David Marsh - - -	Fairfield, Conn. -	March 13, 1844.
Grinding grain, portable mill for - -	Erastus Arnold - -	Otego, N. Y. - -	March 9, 1844.
Grinding mills - - - -	George T. Walters -	Nicholasville, Ky. -	February 12, 1844.
Grist mill - - - - -	John Ansell & J. Gallery	Brooklyn, N. Y. -	August 21, 1844.
Horse power for driving machinery - -	A. D. Childs - -	Rochester, N. Y. -	May 6, 1844.
Horse power for driving machinery - -	Samuel B. Haines -	Greensburgh, Penn. -	December 31, 1844.
Journals, preventing from heating - -	Elisha Reid - -	Columbus, Ga. -	May 25, 1844.
Machinery, governor for regulating the movements of mill wheels, &c. - - -	Henry Burt - -	Boston, Mass. - -	August 31, 1844.
Mill bush - - - - -	John Heck - -	Boonsborough, Md. -	March 26, 1844.
Mill bush - - - - -	Robert W. Wade -	Summit Point, Va. -	May 25, 1844.
Mill, tide - - - - -	John R. Ross - -	New York - -	November 9, 1844.

CLASS XIV.—LUMBER, INCLUDING MACHINES AND TOOLS FOR PREPARING AND MANUFACTURING—SUCH AS SAWING, PLANING, MORTISING, SHINGLE AND STAVE, CARPENTERS' AND COOPERS' IMPLEMENTS.

Barrels, &c., machinery for making	Isaac Crossett	East Bennington, Vt.	July 1, 1844.
Barrels, &c., machinery for making	Horace Baker	McLean, N. Y.	July 30, 1844.
Boring machines to the article to be bored, method of securing	Peter Baylor	Salem, Ohio	July 1, 1844.
Boring timber, machine for	Thomas J. Russell	Franklin Square, Ohio	October 3, 1844.
Boxes, machinery for preparing wood for making	John H. Stevens	New York	December 19, 1844.
Hoops, splitting	William Rose	Philadelphia, Penn.	September 3, 1844.
Lathe, turning boats' oars	Bennet Potter and A. F. Potter	Hubbardstown, Mass.	January 20, 1844.
Lathe, turning irregular forms	Edwin Tucker	Bucyrus, Ohio	October 24, 1844.
Lathe, turning spools	Jonathan H. Cary	North New Salem, Mass.	August 21, 1844.
Lathe, turning wood tapering	Wyllys Avery	Salisbury, N. Y.	June 5, 1844.
Laths and clapboards, sawing	Eliphalet C. Gilman	Canaan, Conn.	August 23, 1844.
Laths, metallic. (See *Class* 2.)			
Logs, setting	Waterman B. Palmer	Brookfield, N. Y.	July 24, 1844.
Match splints, cutting	Hervey Law	Wilmington, N. C.	August 28, 1844.
Plane, bench, setting the bitt	Levi Sanford	East Solon, N. Y.	November 26, 1844.
Roofs. (See *Class* 9.)			
Saw, circular, for cutting off piles under water	Erastus E. Cole	Boston, Mass.	September 14, 1844.
Saw, circular, sawing lumber, mãnner of applying	John K. Mayo	Orrington, Me.	March 20, 1844.
Saw, machine for filing	Calvin B. Rogers	Saybrook, Conn.	December 7, 1844.
Saw, of saw mill without a gate, straining	Calvin Stigleman and A. Seely	Alton, Ill.	December 16, 1844.
Saw-mill carriage, self-setting apparatus for setting logs on	Benjamin Webb	Warren, N. Y.	May 6, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Saw-mill carriage, setting logs on	John B. Squeir	Liberty township, Ohio	October 9, 1844.
Saw-mill carriage, steadying the logs thereon	Henry Stanton	Richland, N. Y.	July 16, 1844.
Saw-mill, head and tail blocks of	Thomas C. Theaker	Bucyrus, Ohio	January 20, 1844.
Saw-mill, self-acting head and tail blocks of	Josiah J. Parker	Plymouth, Ohio	June 13, 1844.
Saw-mill, setting logs on the carriage of	F. M. Stetson and John Eaton	Sangerfield, N. Y. Brookfield, N. Y.	July 15, 1844.
Saw-mill, setting saw logs, and opening and shutting gates of	Nathaniel P. Stearns	Linklaen, N. Y.	October 30, 1844.
Saw-mill, tail blocks of	John Miller	Williamsport, Ohio	January 20, 1844.
Scythe handles and other articles, machine for making	James Embree	Marshalton, Penn.	August 7, 1844.
Shingles, cutting	William Wood	Westport, Conn.	March 20, 1844.
Shingles, cutting	Jason C. Gillett	Bloomfield, Mich.	December 20, 1843; reissued April 3, 1844.
Shingles, cutting	Jonathan P. Bartley	Flanders, N. J.	May 25, 1844.
Shingles, cutting	Tillot Cole	Kent, N. Y.	November 26, 1844.
Shingles, sawing	Israel G. Johnson	Augusta, Me.	August 12, 1844.
Shingles, shaving	Simeon Wood	Worcester, Mass.	January 15, 1844.
Tenoning and mortising machine	Elbridge Lyman	Northfield, Mass.	May 25, 1844.
Tonguing and grooving machine	Charles W. Brown	Boston, Mass.	August 14, 1844.
Vice, standing or bench	Lawren M. Peck	Philadelphia, Penn.	July 18, 1844.
Wood, shaving	William Rose	Philadelphia, Penn.	September 3, 1844.

CLASS XV.—STONE AND CLAY MANUFACTURES, INCLUDING MACHINES FOR POTTERY, GLASS MAKING, BRICK MAKING, DRESSING AND PREPARING STONE, CEMENTS, AND OTHER BUILDING MATERIALS.

Brick, moulding	John Booth and Wm. H. Stevenson	Columbus, Miss.	January 6, 1844.
Brick, moulding	Wm. T. Peters, executor of Ithiel Town	New Haven, Conn.	September 27, 1844.
Brick, press	Mark Twitchell	Gray, Me.	June 10, 1844.
Brick, press	Jeffery Smedley	Columbia, Penn.	August 28, 1844.
Brick, press	C. B. Baker & E. Gifford	Troy, N. Y.	September 7, 1844.
Brick, press	Nathan Sawyer	Baltimore, Md.	September 27, 1844.
Brick, press	Benjamin H. Brown	Philadelphia, Penn.	October 3, 1844.
Brick. (See *Class* 4—*Composition.*)			
Mill stones, dressing	John Black	Helena, Ark.	August 10, 1844.
Stone cutters	Jacob Jenks	Roscoe, Ill.	June 24, 1844.
Stone, dressing	Hammond Ward	Charlton, Mass.	April 10, 1844.

CLASS XVI.—LEATHER, INCLUDING TANNING AND DRESSING, MANUFACTURE OF BOOTS, SHOES, SADDLERY, HARNESS, ETC.

Boots, cork-sole	William L. McCauley	Baltimore, Md.	June 5, 1844.
Boot crimps	Josiah M. Read, assignee of Abraham Thayer, assignee of Josiah Copeland	Boston, Mass.	January 20, 1844.
Boot crimps	Pelatiah Stevens, jr.	Canton, Mass.	July 15, 1844.
Boots, cutting	Thomas Cranage	Warren, Ohio	March 13, 1844.
Boot shank, elastic	Isaiah Gale	Natchez, Miss.	July 11, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Crimps for collar pad	Joseph S. Barkdull	Ballston, N. Y.	July 13, 1844.
Harness, check hooks for	Abel B. Buell	Westmoreland, N. Y.	March 13, 1844.
Harness, horse hames	Nathan Post	Madrid, N. Y.	June 15, 1844.
Harness, horse hames	Joseph K. Slater and Sylvanus G. Pratt	Boston, Mass.	September 20, 1844.
Hats of leather, skins, &c., machinery for forming	Randal Fish	New York	October 12, 1844.
Hides, raw, machine for cutting	William Marshall and J. B. Thursby	Brooklyn, N. Y.	September 4, 1844.
Leather, making	Robert Downey	New Albany, Ia.	June 15, 1844.
Leather, splitting	Alpha Richardson	Boston, Mass.	April 17, 1844.
Saddles, construction of	Samuel Ringgold	Fort McHenry, Md.	October 7, 1844.
Sewing machine, sewing with the running stitch	James Rodgers	New York	July 22, 1844.
Soles, cutting	Richard Richards	Lynn, Mass.	December 16, 1844.
Tanning	John Cox	Gorgie Mills, Edinbro', Scotland	June 5, 1844.
Tanning	Adam Kettering and A. Vogle	Hempfield, Penn.	June 24, 1844.
Tanning	William Brown	Manchester, Md.	August 1, 1844.

CLASS XVII.—HOUSEHOLD FURNITURE, MACHINES AND IMPLEMENTS FOR DOMESTIC PURPOSES, INCLUDING WASHING MACHINES, BREAD AND CRACKER MACHINES, FEATHER DRESSING, ETC.

Bedstead	Wm. F. Converse, R. H. Penny, and R. S. Hanniford	Harrison, Ohio	December 31, 1844.
Bedstead, bureau	Henry W. Kingman	New York, N. Y.	October 12, 1844.
Bedstead, sacking bottoms of	Isaac Cooper	Johnstown, Pa.	October 7, 1844.
Bedstead, sofa	G. L. F. Griswold, assignee of G. Sickels	Middletown, Ct.	December 4, 1844.
Bread, knife for cutting	Franklin Roys	Berlin, Ct.	October 9, 1844.
Brooms, machine for making	Jacob H. Hinton	Lancaster, Pa.	March 13, 1844.
Brushes, scrubbing	George Carver	Chambersburg, Pa.	August 1, 1844.
Brushes, trimming the bristles of, &c.	Samuel Taylor	East Cambridge, Mass.	May 17, 1844.
Chairs, rocking	A. C. Stiles	South Bloomfield, Ohio	September 27, 1844.
Coffee pots	Daniel Rowland	Washington, D. C.	September 17, 1844.
Cracker machine	W. H. Tuttle, assignee of J. Johnson and Otis Freeman	Boston, Mass.	May 17, 1844.
Cutting sausage meat	William Pittinger	Rome, Ohio	March 26, 1844.
Cutting sausage meat	Edwin Clark	Hartford, Ct.	August 31, 1844.
Exercise, machines for producing	Oliver Halsted	New York, N. Y.	March 13, 1844.
Fruit and vegetable preservers	Peter Kephart	Uniontown, Md.	September 24, 1844.
Refrigerator	David Evans	Philadelphia, Pa.	March 26, 1844.
Washing machine	James B. Coffin	Big Prairie, Ohio	February 2, 1844.
Washing machine	Ephraim Lukens	Baltimore, Md.	March 9, 1844.
Washing machine	Lewis Woodward	Medford, N. J.	April 4, 1844.
Washing machine	William Newbrough	Wooster, Ohio	April 17, 1844.
Washing machine	William Soule	Stafford, Ct.	May 17, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Washing machine	Oliver B. Wight	Sturbridge, Mass.	July 9, 1844.
Washing machine	William E. Arnold	Rochester, N. Y.	July 13, 1844.
Washing machine	David Kaufman	Mohecanville, Ohio	August 21, 1844.
Washing machine	Nathan Parish	Rush, N. Y.	December 4, 1844.

CLASS XVIII.—ARTS, POLITE, FINE, AND ORNAMENTAL; INCLUDING MUSIC, PAINTING, SCULPTURE, ENGRAVING, BOOKS, PAPER, PRINTING, BINDING, JEWELRY, ETC.

Block letters, making	Lewis Katen	New York, N. Y.	September 20, 1844.
Inking rollers	Richard M. Hoe	New York, N. Y.	April 17, 1844.
Looking-glass, silvering. (See *Class* 4.)			
Manifold letter writers	Jesse K. Park	New York, N. Y.	November 13, 1844.
Marking and lettering packages, &c.	Wm. Francis and Wm. Johnson	Waynesville, N. C.	October 3, 1844.
Piano forte	Obed M. Coleman	Philadelphia, Pa.	April 17, 1844.
Piano forte	Lovering Ricketts	Baltimore, Md.	June 24, 1844.
Piano forte	Ottoviano Gori and Philip Ernst	New York, N. Y.	March 26, 1844.
Piano forte, tuning pins for	Jos. Shaler Ives	Bristol, Ct.	January 6, 1844.
Printing press	Richard M. Hoe	New York, N. Y.	April 17, 1844.
Printing press	Richard M. Hoe	New York, N. Y.	July 30, 1844.
Printing press	Alonzo Gilman	Troy, N. Y.	August 23, 1844.

Printing press	Seth Adams	Boston, Mass.	September 27, 1844.
Printing in colors	Thomas F. Adams	Philadelphia, Pa.	September 17, 1844.
Stereotyping	Clement Davison	Saratoga, N. Y.	November 26, 1844.

CLASS XIX.—FIRE ARMS, AND IMPLEMENTS OF WAR, AND PARTS THEREOF, INCLUDING THE MANUFACTURE OF SHOT AND GUNPOWDER.

Guns, constructing large	William F. Loper	Philadelphia, Pa.	July 30, 1844.
Fire arms	William W. Hubbell	Philadelphia, Pa.	July 1, 1844.
Fire arms	Edward Savage & Simeon North	Middletown, Ct.	July 30, 1844.
Fire arms, locks for, constructing	Ethan Allen	Norwich, Ct.	November 11, 1837; reissued Jan. 15, 1844.
Fire arms, locks for, constructing	Ethan Allen	Norwich, Ct.	Novem. 11, 1837; reissued January 15, 1844; reissued August 3, 1844.

CLASS XX.—SURGICAL AND MEDICAL INSTRUMENTS, INCLUDING TRUSSES, DENTAL INSTRUMENTS, BATHING APPARATUS, ETC.

Bath, vapor, apparatus for	Alford C. Haines	Plattsburg, N. J.	December 4, 1844.
Corsslets for curved spines, &c.	Alanson Abbé	Roxbury, Mass.	August 7, 1844.
Cupping instruments	Robert J. Dodd	Philadelphia, Penn.	April 13, 1844.
Fractures, apparatus for	Livingston Roe	White Plains, N. Y.	November 6, 1844; antedated May 6, 1844.

N.—LIST OF PATENTS GRANTED DURING THE YEAR 1844—Continued.

Inventions or discoveries.	Patentees.	Residence.	When issued.
Fractures, apparatus for	Lewis Post	Lodi, N. Y.	December 16, 1844.
Invalids, chairs for	James G. Holmes	Charleston, S. C.	September 24, 1844.
Nursing bottle	Eugene Dupuy	New York	October 7, 1844.
Stays for supporting spine of the human body	Lyman Whiton	Troy, N. Y.	October 12, 1844.
Teeth, setting artificial	J. Jmith Dodge	New York	March 13, 1844.
Truss	David Sabin	Lancaster, Pa.	March 20, 1844.
Truss	Epenetus Bennet	New York	April 30, 1844.
Truss	Carter & Reinhardt	Baltimore, Md.	September 24, 1844.
Truss	Eliakim C. Darling	New Orleans, La.	November 6, 1844.
Truss	Calvin Cutter	Springfield, Mass.	December 16, 1844.
Uterine injections, instruments for	Dan Gale	Boston, Mass.	October 16, 1844.

CLASS XXI.—WEARING APPAREL, ARTICLES FOR THE TOILET, ETC., INCLUDING INSTRUMENTS FOR MANUFACTURING.

Garments, fitting ladies' dresses	Samuel S. Richardson	Baldwiu, Me.	April 4, 1844.
Hooks and eyes	Elisha C. Savage	Hartford, Conn.	March 26, 1844.
Pins sticking into paper. (See *Class* 2.)			
Suspender buckles	Henry Dubosq	Philadelphia, Pa.	April 25, 1844.
Tailors' measures	Henry Isham	Montpelier, Vt.	May 30, 1844.
Tailors' measures	John B. Combs	Trenton, N. J.	November 9, 1844.

Awnings, improvement in	John Sebo	Wilmington, Del.	May 25, 1844.
India rubber, cutting	Henry G. Tyer and John Helm	New Brunswick, N. J.	October 9, 1844.
India rubber fabrics	Charles Goodyear	New York	March 9, 1844.
India rubber fabrics	Charles Goodyear	New York	March 9, 1844.
India rubber fabrics	Charles Goodyear	New York	June 15, 1844.
India rubber goods, corrugated and shurred	Horace H. Day	Jersey City, N. J.	October 12, 1844; antedated June 9, 1844.
Trap for catching animals	Thomas Shailer	Haddam, Conn.	May 10, 1844.

Patents extended by act of Congress approved 4th July, 1836.

Time of renewal.	Patentees.	Inventions.	Date of patent.
September 17, 1844—seven years from October 4, 1844	Isaac Adams	Printing press	October 4, 1830.
October 7, 1844—seven years from November 6, 1844	William Annesley	Building boats and other vessels	November 6, 1830.

Improvements added to original patents granted during the year 1844.

No.	Patentees.	Residence.	Inventions or discoveries.	When issued.	
				Patent.	Improvement.
67	Battin, Joseph	Philadelphia, Pa.	Breaking and screening coal	Oct. 6, 1843	Jan. 20, 1844.
61	Duff, William	Baltimore, Md.	Hydrostatic-weighted steam valve	July 28, 1843	Nov. 26, 1844.
68	Foster, William	Washington, D. C.	Plane stock	Nov. 24, 1843	Mar. 16, 1844.
70	Tims, John H.	Newark, N. J.	Oil boxes for railroad cars, &c.	Oct. 31, 1839; reissued June 13, 1844	July 1, 1844.
69	Williams, Daniel	Troy, N. Y.	Stoves	Feb. 3, 1836; reissued Nov. 21, 1840	Mar. 26, 1844.

Patents granted under the act of Congress approved August 29, 1842.

Patentees.	Residence.	Design.	When issued.
Albro, James, jr.	Elizabethtown, N. J.	For printing floor cloths	December 20, 1844.
Dubosq, Henry	Philadelphia, Penn.	For child's whistle	May 6, 1844.
Edwards, Jacob D.	Elizabethtown, N. J.	For canvass carpets	March 20, 1844.
Gibney, Michael	New York	For spoons, forks, &c.	December 4, 1844.
Hampton, Adam	New York	For grates	May 17, 1844.
Johnson, Geer, & Cox, assignees of Ezra Ripley	New York	For stove plate	November 26, 1844.
King, John C.	Boston, Mass.	In bust of Robert Burns	January 31, 1844.
Mott, Jordan L.	New York	For stoves	February 12, 1844; antedated December 1, 1843.
Simons, George W.	Philadelphia, Penn.	For pencil cases	November 18, 1844.
Thompson, Henry G.	New York	For carpets	April 4, 1844.
Wellstood, John G., assignee of Salathiel Ellis	New York	Of a medallion bust of Theodore Frelinghuysen	September 27, 1844; antedated Aug. 12, 1844.
Whitney, Amaziah	Albany, N. Y.	For stoves	July 19, 1844.

Reissues.

Patentees.	Issue.	Reissue.
Allen, Ethan - - -	November 11, 1837	January 15, 1844.
Allen, Ethan - - -	November 11, 1837	January 15, 1844; reissued August 3, 1844.
Bullock, S. W. - -	March 23, 1842	August 14, 1844.
Day, Moses - - -	April 30, 1840	March 13, 1844.
Gillett, Jason C. - -	December 20, 1843	April 30, 1844.
Tims, John H. - -	October 31, 1839	June 13, 1844.
Worthington, Henry R. -	July 24, 1844	September 7, 1844.

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Alphabetical list of patentees for the year 1844, *with their places of residence.*

No.	Patentees.	Residence.
3691	Abbé, Alanson - - - -	Roxbury, Mass.
3769	Adams, Seth - - - -	Boston, Mass.
3744	Adams, Thomas F. - - -	Philadelphia, Penn.
10	Albro, James, jr., (design) - -	Elizabethtown, N. J.
3416	Allan, William K. - - -	Brownston, Ky.
60	Allen, Ethan, (reissue) - - -	Norwich, Conn.
64	Allen, Ethan, (reissue) - - -	Norwich, Conn.
3827	Amelung, H. A. - - -	Alton, Illinois.
3608	Amoskeag Manufacturing Company, assignees of William A. Burke -	Manchester, N. H.
3711	Ansell, John, and James Gallery -	Clinton, Michigan, now of Brooklyn, N. Y.
3468	Arnold, Erastus - - -	Otego, N. Y. - -
3665	Arnold, William E. - - -	Rochester, N. Y.
3618	Avery, Wyllys - - - -	Salisbury, N. Y.
3508	Bailey, Laommi - - -	Boston, Mass.
3683	Baker, Horace - - - -	McLean, N. Y.
3731	Baker & Gifford - - -	Troy, N. Y.
3552	Barber, Sprague - - -	New York.
3843	Barbour, Horace, and John Gleason -	Lowell, Mass.
3661	Barkdull, Joseph S. - - -	Ballston, N. Y.
3676	Barnum, Daniel - - -	Bridgeport, Conn.
3600	Bartley, Jonathan P. - - -	Flanders, N. J.
3755	Bartoll, Barnabas H. - - -	Coldspring, N. Y.
3707	Barton, Gardner, jr. - - -	Waterford, N. Y.
3438	Battin, Joseph - - - -	Philadelphia, Penn.
3539	Bay, James M. - - - -	Harrisburg, Penn.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3645	Baylor, Peter	Salem, Ohio.
3451	Bazin, Stephen and James A.	Canton, Mass.
3767	Beecher, Mather	Remsen, N. Y.
3557	Bennet, William	New York.
3571	Bennett, Epenetus A.	New York.
3454	Benson, Joseph	Boston, Mass.
3613	Bent, Thomas. (See *Resor.*)	
3556	Bentley, Harmess	Ballston, N. Y.
3470	Bentz, Samuel	Boonsborough, Md.
3611	Bingham, Albert	Boston, Mass.
3819	Birdsell, James	Hamorton, Penn.
3699	Black, John	Helena, Ark.
3730	Blaney, Benjamin	Boston, Mass.
3399	Booth, John, and William H. Stephenson	Columbus, Miss.
3636	Bradley, Jephtha	St. Albans, Vt.
3834	Bradley, Leman	Sharon, Conn.
3853	Bradley, Leman	Sharon, Conn.
3397	Brayton, William H.	Warren, R. I.
3525	Brenner, Dierck	Petersburg, Tenn.
3596	Broadmeadow, Simeon	New York.
3605	Broadmeadow, Simeon	New York.
	Broadmeadow. (See *Green.*)	
3455	Brower, Jacob W.	Mount Airy, N. C.
3770	Brown, Benjamin H.	Philadelphia, Penn.
3704	Brown, Charles W.	Boston, Mass.
3474	Brown, Harvey	Payson, Ill.
3688	Brown, William	Manchester, Md.
3641	Bruce, Aaron F.	Marshall Post Office, Mo.
3680	Buchanan, Ryburn	Sullivan county, Tenn.
3448	Buck, E., assignee of Peter Lear	Boston, Mass.
3448	Buel, Abel B.	Westmoreland, N. Y.
3476	Bulkley, Ralph	New York.
3752	Bull, J. H. and R. H.	New York.
65	Bullock, S. W. (reissue)	Williamsburg, N, Y.
3608	Burke, W. A. (See *Amoskeag Manufacturing Company.*)	
3722	Burt, Henry	Boston, Mass.
3519	Bush, Rosswell	Rochester, N. Y.
3402	Butler, Constant B.	Petersburg, Tenn.
3712	Butterfield, Benjamin	Kensington, Penn.
3640	Camp, Henry W.	Oswego, N. Y.
3530	Carnegy, John	Tully, Mo.
3741	Carr, Shannon, & Carr	Sunbury, Penn.
3760	Carter & Reinhardt	Baltimore, Md.
3521	Carver, Eleazer	Bridgewater, Mass.
3689	Carver, George	Chambersburg, Penn

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3710	Cary, Jonathan H. - - -	North New Salem, Mass.
3558	Cathcart, Charles W. - - -	New Durham, Ia.
3733	Chamberlin, Edward - - -	Boston, Mass.
3774	Chandler, Adoniram - - -	New York.
3852	Chandler, Thomas, and - -	Rockland, Ill.
	Asa D. Reed - - - -	Niles, Mich.
3679	Chatterton, Richard D. - - -	Derby, England.
3445	Chesnut, William D. - - -	Wilmington, Del.
3572	Childs, A. D. - - - -	Rochester, N. Y.
3547	Choate, Warren C. - - -	Washington, D. C.
3656	Chollar, Jones, & Law, assignees of Chollar & Parmelee - - -	West Troy, N. Y.
3723	Clark, Edwin - - - -	Hartford, Conn.
3499	Clarke, James M. - - -	Strasburg, Penn.
3400	Cline, John - - - -	Norwalk, Ohio.
3660	Cochrane, John - - -	Newark, N. J.
3422	Coffin, James B. - - -	Big Prairie, Ohio.
3737	Cole, Erastus E. - - -	Boston, Mass.
3696	Cole, Thomas, and John Littlefield -	Allensville, Ia.
3837	Cole, Tillott - - - -	Kent, N. Y.
3548	Coleman, Obed M. - - -	Philadelphia, Penn.
3395	Colton, Sabin - - - -	Philadelphia, Penn.
3820	Combs, John B. - - -	Trenton, N. J.
3872	Converse, William F., Richard H. Penny, and Richard S. Hanniford -	Harrison, Ohio.
3460	Cook, George W. - - -	St. Louis, Mo.
3740	Cook, Rosswell - - -	Elkland, Penn.
3778	Cooper, Isaac - - - -	Johnstown, Penn.
3439	Cope, Samuel and J. D. - -	Damascusville, Ohio.
3410	Copeland, Josiah. (See *Reed, J. M.*)	
3456	Cornell, Ezra - - - -	Ithaca, N. Y.
3449	Covel, Emerson G. - - -	Glenn's Falls, N. Y.
25	Cox, D. B. (See *Johnson, E.*) -	
3614	Cox, John - - - -	Gorgie Mills, Edinburgh, Scotland.
3464	Cram, Smith - - - -	New York.
3481	Cranage, Thomas - - -	Warren, Ohio.
3867	Crawford, A. B. - - -	Wooster, Ohio.
3732	Crawford, Benjamin - - -	Allegany city, Penn.
3618	Crossett, Isaac - - - -	East Bennington, Vt.
	Crudgington. (See *Southall.*)	
3573	Crutchet, James - - -	Great Britain, now in Cincinnati, Ohio.
3856	Cutter, Calvin - - - -	Springfield, Mass.
3638	Cutting, James A. - - -	Haverhill, N. H.
	Dakin, S. D. (See *Moody, R.*)	

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3812	Darling, Eliakim C. - - -	New Orleans, La.
3697	Davenport & Bridges, assignees of Charles Davenport - - -	Cambridgeport, Mass.
3836	Davison, Clement - - -	Saratoga, N. Y.
3788	Day, Horace H. - - -	Jersey city, N. J.
61	Day, Moses, (reissue) - - -	Roxbury, Mass.
3584	De Liancourt (See *Francis.*)	
3822	Dennett, Daniel - - -	Centreville, La.
3598	Deutsch, Edouard - - -	France.
3537	Dodd, Robert J. - - -	Philadelphia, Pa.
3485	Dodge, J. Smith - - -	New York.
3734	Donisthorpe, George E. - -	Bradford, England.
3632	Downey, Robert - - -	New Albany, Ia.
3500	Draper, Francis - - -	East Cambridge, Mass.
3702	Drayton, Thomas - - -	Brighton, England.
3559	Dubosq, Henry - - -	Philadelphia, Pa.
20	Dubosq, Henry, (design) - -	Philadelphia, Pa.
3844	Dunn, Arthur - - - -	Rotherhithe, England.
3780	Dupuy, Eugene - - - -	New York.
3469	Durgin, Silas C. - - -	North Chelmsford, Mass.
3709	Dyzert, William - - -	Gettysburg, Pa.
	Easton. (See *Stetson.*)	
3582	Eddy. (See *Jarves.*)	
18	Edwards, Jacob D., (design) - -	Elizabethtown, N. J.
3651	Edwards, Oliver, and Edwin Holman	Boston, Mass.
	Edwards, Oliver. (See *Stephenson, M. R.*)	
	Edwards, Oliver. (See *Stephenson, M. R.*)	
23	Ellis, Salathiel. (See *Wellstood, J. G.*)	
3789	Ellis, Zabina - - - -	Kensington, Pa.
3695	Embree, James - - -	Marshallton, Pa.
3869	Ericsson, John - - - -	New York.
	Ernst, Philip. (See *Gori, O.*)	
3809	Esterly, George - - -	Heart Prairie, W. T.
3506	Evans, David - - - -	Philadelphia, Pa.
3518	Farrar, Alonzo - - -	Boston, Mass.
3544	Fatman, Joseph - - -	Philadelphia, Pa.
3502	Ferguson, Hiram - - -	Richland, N. Y.
3591	Fernald, Henry B. - - -	Boston, Mass.
3693	Field, William - - - -	Pawtucket, R. I.
3533	Fink, Julius - - - -	Philadelphia, Pa.
3590	Fish, Randal - - - -	Philadelphia, Pa.
3828	Fisk, Ezra - - - -	Fayette, Me.
3823	Fitzgerald, Elisha - - -	New York.
3833	Fletcher, Matthew - - -	London, England.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3428	Forsyth, William T. - - -	Philadelphia, Pa.
68	Foster, William, (additional improvement to 3355) - - -	Washington, D. C.
3751	Fowler, De Grasse - - -	North Branford, Ct.
3584	Francis, Joseph, assignee of Callistus Aug. de Liancourt - - -	New York.
3771	Francis, William, and Wm. Johnson -	Waynesville, N. C.
3646	Fulkerson, Jacob D. - - -	Unity, Ohio.
3626	Fulton, Calvin - - -	Rochester, N. Y.
3800	Gale, Dan - - - -	Boston, Mass.
3657	Gale, Isaiah - - - -	Natchez, Miss.
	Gallery. (See *Ansell.*)	
3503	Gardiner, Perry G. - - -	New York.
3534	Garrison, Henry and George - -	Newburg, N. Y.
3581	Gatling, Richard J. - - -	Murfreesborough, N. C.
	Geer, G. (See *Johnson*, E.) - -	
26	Gibney, Michael, (design) - -	New York.
	Gifford. (See *Baker.*)	
3813	Gignoux, Claudius, assignee of Louis Henry - - - -	New York. Paris, France.
3826	Gilbert, Joseph - - -	Frease's P. O., Ohio.
62	Gillett, Jason C., (reissue) - -	Bloomfield, Mich.
3716	Gilman, Alonzo - - -	Troy, N. Y.
3715	Gilman, Eliphalet C. - - -	Canaan, Ct.
	Gleason, John. (See *Barbour, H.*)	
3461	Goodyear, Charles - - -	New York.
3462	Goodyear, Charles - - -	New York.
3633	Goodyear, Charles - - -	New York.
3619	Gordon, James W. W. - -	Baltimore, Md.
3504	Gori, Ottoviano, and Philip Ernst -	New York.
3785	Gould, Ezra - - - -	Paterson, N. J.
3453	Grandjean, Auguste - - -	New York.
3409	Green, W., assignee of S. Broadmeadow	Woodbridge, N. J.
3488	Griswold, Giles L. F., assignee of L. E. Hicks - - - - -	Middletown, Ct.
3845	Griswold, Giles L. F., assignee of Gerard Sickels - - - -	Middletown, Ct.
3658	Groat, Jacob - - - -	Troy, N. Y.
3659	Groat, Jacob - - - -	Troy, N. Y.
3817	Groat, Jacob - - - -	Troy, N. Y.
3564	Grout, John B. - - -	Birmingham, Mich.
3496	Grout, John H., and Fowler M. Ray -	New York.
3794	Guernsey, Calvin O. - - -	Russia, N. Y.
3473	Hager, Abraham - - -	Donaldsonville, La.
3846	Haines, Alford C. - - -	Plattsburg, N. J.
	Haines, F. (See *Kilburn, W.*)	

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3871	Haines, Samuel B. - - -	Greensburg, Penn.
3480	Halsted, Oliver - - -	New York.
3664	Hamlin, Lemon - - -	Kirkersville, Ohio.
3809	Hammond, Thomas - - -	New York.
21	Hampton, Adam, (design) - -	New York.
3435	Harley, Benj. F., and John D. Morris -	Philadelphia, Penn.
3806	Harned and Elliott, assignees of Joseph Saxton and George Elliott - -	Philadelphia, Penn.
3684	Harris, James S. - - -	Poultney, Vt.
3627	Hatch, George W. - - -	Parkman, Ohio.
3440	Hatch, Julius W. - - -	Manlius, N. Y.
3574	Hatfield, Jehu - - - -	Glenn's Falls, N. Y.
3505	Heck, John - - - -	Boonsborough, Md.
	Helm, John. (See *Tyer, H. G.*)	
3821	Hemingway, Daniel - - -	Leesburg, Ky.
3692	Hemmenway, B. (See *Lewis, W.*)	
3813	Henry, Louis. (See *Gignoux, C.*)	
3538	Herbert, James - - -	Lagrange, Ia.
3628	Hermance, John C. - - -	Schenectady, N. Y.
3488	Hicks, L. E. (See *Griswold.*)	
3777	Hills, Dudley - - - -	East Hartford, Ct.
3483	Hilton, Jacob H. - - -	Lancaster, Penn.
3550	Hoe, Richard M. - - -	New York.
3551	Hoe, Richard M. - - -	New York.
3687	Hoe, Richard M. - - -	New York.
3651	Holman, E., and O. Edwards, (See *Stephenson.*)	
3761	Holmes, James G. - - -	Charleston, S. C.
3735	Horn, Edwin B. - - -	Boston, Mass.
3413	Hoskings, Thomas H. - - -	Crawfordsville, Ia.
3447	Hotchkin, Ashley - - -	Maryland, N. J.
3431	Hovey, William - - -	Worcester, Mass.
3649	Hubbell, William W. - - -	Philadelphia, Penn.
3772	Hurd, Joseph - - - -	Stoneham, Mass.
3854	Hurd, Joseph - - - -	Stoneham, Mass.
3673	Huse, Enoch - - - -	Newburyport, Mass.
3868	Isbister, Caleb - - - -	Allegheny, Penn.
3603	Isham, Henry - - - -	Montpelier, Vt.
3403	Ives, Jos. Shaler - - -	Bristol, Ct.
3637	Jackson, Amos - - -	Mount Holly, N. J.
3398	James, Aaron E. - - -	Point Pleasant, Va.
3588	James, Henry B. - - -	Mount Holly, N. J.
3582	Jarves, D., and New England Glass Company, assignees of R. H. Eddy -	Boston, Mass.
3642	Jenks, Jacob - - - -	Roscoe, Ill.
3793	Jennings, Isaiah - - -	New York.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
25	Johnson E., G. Geer, and D. B. Cox, assignees of Ezra Ripley, (design) -	Troy, N. Y.
3866	Johnson, Edwin F. - - -	New York.
3701	Johnson, Israel G. - - -	Augusta, Me.
3585	Johnson, John, and O. Freeman. (See *Tuttle, W. H.*)	
3510	Johnson, Nelson - - -	Rathboneville, N. Y.
3441	Jones, S. S. - - - -	Philadelphia, Penn.
3750	Katen, Lewis - - - -	New York.
3713	Kaufman, David - - -	Mohecanville, Ohio.
3728	Kendall, Thomas - - -	New York.
3682	Kenney, Cyrus - - -	Troy, N. Y.
3690	Kenney, Cyrus - - -	Troy, N. Y.
3717	Kenney, Cyrus - - -	Troy, N. Y.
3758	Kephart, Peter - - -	Uniontown, Md.
3531	Kesselmeier, Friedrick - - -	Wooster, Ohio.
3535	Kesselmeier, Friedrick - - -	Wooster, Ohio.
3442	Ketchum, Archibald C. - -	Schenectady, N. Y.
3831	Ketchum, William F. - - -	Buffalo, N. Y.
3848	Ketler, Adam - - - -	Philadelphia, Penn.
3639	Kettering, Adam, and A. Vogle -	Hempfield, Penn.
3870	Kilburn, W., and - - -	Lawrenceville, Penn.
	F. Haines - - - -	Marietta, Penn.
16	King, John C., (design) - -	Boston, Mass.
3792	Kingman, Henry W. - - -	New York.
3671	Kymer, John - - - -	Caermarthen, South Wales, England.
3798	Ladrange, Pierre E. - - -	Vignory, kingdom of France.
3489	Lamb, Seth - - - -	New York.
3511	Lane, Isaac C. - - - -	Waltham, Mass.
3662	Laurence, Henry - - -	Manlius, N. Y.
3748	Lauve, Norbert - - -	Plaquemines, La.
3719	Law, Hervey - - - -	Wilmington, N. C.
3448	Lear, Peter. (See *Buck, E.*)	
3526	Leland, Abner - - - -	Milton, Penn.
3426	Lester, Ebenezer A. - - -	Boston, Mass.
3700	Lester, Ebenezer A. - - -	Boston, Mass.
3753	Lewis, James - - - -	Amsterdam, N. Y.
3692	Lewis, Winslow, sen., and -	Boston, Mass.
	Benjamin Hemmenway - -	Roxbury, Mass.
3714	Ling, Thomas - - - -	Portland Me.
3736	Locke, Edward - - -	Newport, England.
3465	Long, Israel - - - -	Bucyrus, Ohio.
3459	Loper, Richard F. - - -	Philadelphia, Penn.
3685	Loper, Richard F. - - -	Philadelphia, Penn.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3786	Loper, Richard F. - - -	Philadelphia, Penn.
3427	Loring, Thomas - - -	Gloucester, N. J.
	Loveland, J. C. (See *Wood, W. A.*)	
3472	Lukens, Ephraim - - -	Baltimore, Md.
3602	Lyman, Elbridge - - -	Northfield, Mass.
3830	Lyon, James H. - - -	Schenectady, N. Y.
3652	Madden, John - - - -	Warren, Ohio.
3851	Maguire, John - - - -	Washington, D. C.
3407	Mallory, Meredith - - -	Mount Morris, N. Y.
3842	Maples, Darius W. - - -	Geneva, N. Y.
	Marsh, D. (See *Nichols, Eli B.*)	
3743	Marshall, William, and J. B. Thursby -	Brooklyn, N. Y.
3840	Martin, John, jr. - - -	Aztalan, W. T.
3494	Mayo, John K. - - -	Orrington, Me.
3540	McAll, William - - -	Talladega, Ia.
3493	McCarty, Henry - - -	Pittsburg, Penn.
3615	McCauley, William L. - -	Baltimore, Md.
3578	McCollum, James - - -	Wilsonville, Ala.
3801	McCully, Francis, jr. - - -	Paterson, N. J.
3437	McDonough, Thomas - - -	Middletown, Con.
	McIntire, J. (See *Walker, Richard.*)	
3478	McWilliams, Alexander - -	Washington, D. C.
3477	Merritt, Caleb - - - -	Baltimore, Md.
3412	Miller, John - - - -	Williamsport, Ohio.
3775	Miller, Rudolph - - -	York, Penn.
3570	Mills, Peter - - - -	Binghampton, N. Y.
3824	Mini, John G. - - - -	Philadelphia, Penn.
3452	Montgomery, William - - -	Boston, Mass.
3745	Moody, R., and S. D. Dakin - -	New York.
3644	Mooers, Jonathan - - -	Hazleton, Penn.
3490	Moor, Albert - - - -	Hampden, Me.
3396	Moore, George R. - - -	Brattleborough, Vt.
3414	Moreau, Gabriel H. - - -	France.
3415	Moreau, Gabriel H. - - -	France.
3746	Morewood, Edmund P. - -	Great Britain, now in New York.
3609	Morgan, Amos - - -	Wooster, Ohio.
3675	Morgan, Morgan, jr. - - -	New York.
3565	Morris, Edmund - - -	Philadelphia, Penn.
3738	Morris, Edmund - - -	Philadelphia, Penn.
	Morris, John D. (See *Harley, B. F.*)	
3432	Mott, Jordan L. - - -	New York.
17	Mott, Jordan L., (design) - -	New York.
3516	Mumford, Silas G. - - -	North Providence, R. I.
3799	Muzzio, Muzio - - -	Bologna, Italy.
3514	Myers, Gideon - - - -	Bridgewater, N. Y.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
	Nason. (See *Scammon.*)	
3560	Naylor, Peter - - - -	New York.
3406	Nelson, Robert - - -	West Point, Ia.
	Nelson, T. H. (See *Young, E. W.*)	
3549	Newbrough, William - - -	Wooster, Ohio.
3747	Newell, Robert - - -	New York.
3479	Nichols, Eli B., and David Marsh -	Fairfield, Conn.
3527	Nichols, George - - -	Trumbull, Conn.
3865	Nicolls, Gustavus A. - - -	Reading, Penn.
3668	Nicolson, Samuel - - -	Boston, Mass.
3599	Nield, James - - - -	Taunton, Mass.
3486	North, Oren S. - - - -	New Britain, Conn.
	North, S. (See *Savage, E.*)	
3563	Noyes, Isaac - - - -	Kanawha Saline, Va.
3757	Owen, Edwin - - - -	Laporte, Ia.
3832	Packard, Manning and Christian B. -	Clarendon, N. Y.
3705	Pagin, John - - - -	Michigan city, Ia.
3561	Paine, Charles F. - - -	Winslow, Me.
3463	Palmer, Moses - - -	Baltimore, Md.
3678	Palmer, Waterman B. - - -	Brookfield, N. Y.
3847	Parish, Nathan - - -	Rush, N. Y.
3825	Park, Jesse K. - - - -	New York.
	Parker, Elmon. (See *Young, J.*)	
3443	Parker, Ephraim and Thomas - -	Orangetown, Penn.
3629	Parker, Joseph J. - - -	Plymouth, Ohio.
3656	Parmelee, H. (See *Choller, J. B.*)	
3482	Partridge, Benoni F. - - -	Onondaga, N. Y.
3429	Pease, Abram - - - -	Lyons, N. Y.
3466	Peck, George - - - -	Fairfield, Conn.
3721	Peck, Jacob - - - -	Oakland, Penn.
3670	Peck, Lauren M. - - -	Philadelphia, Penn.
3597	Perry, Stuart - - - -	Newport, N. Y.
3762	Peters, William T., executor of I. Town	New Haven, Conn.
3433	Pettes, Simon - - - -	Schenectady, N. Y.
3509	Pittenger, William - - -	Rome, Ohio.
3859	Post, Lewis - - - -	Lodi, N. Y.
3634	Post, Nathan - - - -	Madrid, N. Y.
3408	Potter, Bennet and A. F. - -	Hubbardstown, Mass.
3861	Potter, William L. - - -	Clifton Park, N. Y.
3562	Pratt, Loea - - - -	Amherst, N. H.
	Pratt, S. G. (See *Slater, J. K.*)	
3523	Pratt, Thomas W., and - - Caleb Pratt - - - -	Norwich, Conn. Boston, Mass.
3815	Prescott, Jedediah - - -	Memphis, Tenn.
3739	Provost, William F. - - -	Barnwell district, S. C
3703	Putney, David - - - -	Redbank, Penn.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3457	Quail, John H. - - -	Philadelphia, Pa.
3694	Rand, John - - - -	Citizen of the U. States, now in England.
	Ray, Fowler M. (See *Grout, J. H.*)	
3410	Read, Josiah M., assignee of Abraham Thayer, assignee of Jos. C. Copeland	Boston, Mass.
	Reed, Asa D. (See *Chandler, T.*)	
3595	Reid, Elisha - - - -	Columbus, Ga.
	Reinhardt. (See *Carter.*)	
3613	Resor, Wm. and R. P., assignees of Thomas Bent - - -	Cincinnati, Ohio.
3607	Reynolds, Griffin, jr. - - -	Washington, Ky.
3653	Reynolds, John - - -	Newberry, Pa.
3841	Reynolds, Oliver - - -	Webster, N. Y.
3425	Reynolds, R., jr. - - -	Beaufort, S. C.
3681	Reynolds, Samuel Godfrey - -	Bristol, R. I.
3589	Rice, Dennis - - - -	Rowe, Mass.
3857	Richards, Richard - - -	Lynn, Mass.
3541	Richardson, Alpha - - -	Boston, Mass.
3522	Richardson, Samuel S. - -	Baldwin, Me.
3643	Ricketts, Lovering - - -	Baltimore, Md.
3807	Riggs, John W. - - -	Fort Plain, N. Y.
3417	Riley, William W. - - -	Mansfield, Ohio.
3779	Ringgold, Samuel - - -	Fort McHenry, Md.
3724	Ripley, Ezra - - - -	Troy, N. Y.
25	Ripley, Ezra. (See *Johnson, E.*)	
3796	Robbins, Zenas C. - - -	St. Louis, Mo.
3804	Robinson, J. D. - - -	Peoria, Ill.
3555	Robinson, Peter - - -	Waterloo, N. Y.
3672	Rodgers, James - - -	New York.
3810	Roe, Livingston - - -	White Plains, N. Y.
3849	Rogers, Calvin B. - - -	Saybrook, Ct.
3765	Rogers, Henry I. - - -	Baltimore, Md.
3401	Roome, William J. - - -	New York.
3575	Roop, Benjamin - - -	Pekin, Ohio.
3726	Rose, William - - - -	Philadelphia, Pa.
3727	Rose, William - - - -	Philadelphia, Pa.
3590	Ross, Charles - - - -	Piqua, Ohio.
3816	Ross, John R. - - - -	New York.
3749	Rowland, Daniel - - -	Washington, D. C.
3783	Roys, Franklin - - -	Berlin, Ct.
	Russell, Isaac D. (See *Waterman.*)	
3776	Russell, Thomas J. - - -	Franklin Square, Ohio.
3467	Rust, Samuel - - - -	New York.
3498	Sabin, David - - - -	Lancaster, Pa.
3446	Sanderson, Robert - - -	Athens, Ohio.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3838	Sanford, Levi - - - -	East Solon, N. Y.
3686	Savage, Edward, and S. North -	Middletown, Ct.
3512	Savage, Elisha C. - - -	Hartford, Ct.
3768	Sawyer, Nathan - - -	Baltimore, Md.
3806	Saxton, J., and G. Elliott. (See *Harned & Elliott.*)	
3532	Scammon, Samuel, and R. Nason -	Waterville, Me.
3616	Schermerhorn, Jason B. - -	New York.
3725	Sealy, Richard - - - -	New York.
3594	Sebo, John - - - -	Wilmington, Del.
3475	Sellers, Charles, and Geo. Escol Sellers	Cincinnati, Ohio.
3631	Sewell, William, jr. - - -	Macon, Pa.
3580	Shailer, Thomas - - -	Haddam, Ct.
	Shannon. (See *Carr.*)	
3568	Sherard, John H. - - -	Livingston, Ala.
3536	Shnell, James S. - - -	Shiremanstown, Pa.
3802	Sickels, Frederick E. - - -	New York.
	Sickels, Gerard. (See *Griswold.*)	
24	Simons, Geo. W., (design) - -	Philadelphia, Pa.
3754	Slater, Jos. K., and S. G. Pratt -	Boston, Mass.
3515	Smart, John - - - -	Philadelphia, Pa.
3720	Smedley, Jeffery - - -	Columbia, Pa.
3576	Smith, Aaron - - - -	Bloomfield, Mich.
3579	Smith, Aaron - - - -	Bloomfield, Mich.
3404	Smith, David - - - -	South Hill, Va.
3773	Smith, Elisha - - - -	Erving, Mass.
3444	Smith, Hiram H. - - -	Richmond, Va.
3718	Smith, Joseph - - - -	New Mansfield, Ohio.
3621	Smith, William H. - - -	Georgetown, D. C.
3569	Snyder, Elisha S. - - -	Charleston, Va.
3586	Soule, William - - -	Stafford, Ct.
3742	Southall, Thos., and Chs. Crudgington	Kidderminster, England.
3635	Spicker, Charles F. - - -	New York.
3729	Sprout, Erastus T. - - -	Dimock, Pa.
3787	Squier, John B. - - -	Liberty Township, O.
3829	Stanley, William - - -	Jamestown, N. C.
3669	Stanton, Henry - - -	Richfield, N. Y.
3524	Starr, Samuel L. - - -	Mexico, Pa.
3808	Stearns, Nathaniel P. - - -	Linklaen, N. Y.
3543	Stephenson, M. R., and Oliver Edwards	Boston, Mass.
3546	Stephenson, M. R., and Oliver Edwards	Boston, Mass.
3651	Stephenson, M. R., and Oliver Edwards; Stephenson having assigned his right, &c., to Edwin Holman -	Boston, Mass.
3667	Stetson, F. M., and - - -	Sangerfield, N. Y.
	John Eaton - - - -	Brookfield, N. Y.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3862	Stevens, John H. - - -	New York.
3666	Stevens, Pelatiah, jr. - - -	Canton, Mass.
3553	Stevens, Phineas - - -	Nashua, N. H.
	Stevenson, W. H. (See *Booth, John.*)	
3863	Stickney, Gage - - -	Blackwoodtown, N. J.
3858	Stigleman, Calvin, and Austin Seely -	Alton, Ill.
3764	Stiles, A. C. - - - -	South Bloomfield, Ohio.
3567	Stimpson, Albert - - -	Rockingham, Vt.
3587	Stimpson, Herbert H. - - -	Boston, Mass.
3592	Straub, Abraham - - -	Milton, Pa.
3612	Straub, Isaac - - - -	Cincinnati, Ohio.
3620	Stuart, Frederick A. - - -	Catharine, N. Y.
3647	Stuart, Frederick A. - - -	Catharine, N. Y.
3566	Sumner, Palmer - - -	New York.
3604	Sutton, Samuel G. - - -	Yorkshire, N. Y.
3864	Taylor, Anthony - - -	New Garden, Ohio.
3791	Taylor, E. - - - -	Rochester, N. Y.
3811	Taylor, Ezra - - - -	Monroe, N. Y.
3418	Taylor, John - - - -	Shade Gap, Pa.
3593	Taylor, Samuel - - -	East Cambridge, Mass.
3411	Theaker, Thomas C. - - -	Bucyrus, Ohio.
3501	Thompson, Ambrose W., - -	Philadelphia, Pa.
19	Thompson, Henry G., (design) -	New York.
3542	Thompson, John - - -	Ripley, Ohio.
3650	Thorndike, John H. - - -	Boston, Mass.
3766	Thorp, John - - - -	North Wrentham, Mass.
	Thursby. (See *Marshall.*)	
3545	Tillman, Samuel D. - - -	Seneca Falls, N. Y.
3763	Timby, Theodore R. - - -	Cato, N. Y.
63	Tims, John H., (reissue) - -	Newark, N. J.
3513	Tobin, John - - - -	Bloomfield, N. J.
3450	Tolles, Elisha - - - -	New York.
3850	Tower, Jonas - - - -	Madison, Ohio.
	Town, Ithiel. (See *Peters.*)	
3756	Trail, Archibald - - -	Great Britain,
3674	Troughton, Nicholas - - -	Swansea, England.
3805	Tucker, Edwin - - -	Bucyrus, Ohio.
3583	Tuttle, William H., assignee of John Johnson and Otis Freeman - -	Boston, Mass.
3622	Twitchell, Mark - - -	Gray, Me.
3782	Tyer, Henry G., and John Helm -	New Brunswick, N. J.
3855	Valentine, Samuel L. - - -	Bangor, Me.
3887	Varnel, Reuben C. - - -	West Somers, N. Y.
3818	Vermillion, Dennis - - -	Washington, D. C.
3471	Verplank, Isaac B. - - -	Mentz, N. Y.
3708	Vestal, Aaron H. - - -	Cambridge city, Ia.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3458	Vine, William - - - -	New York.
3639	Vogle. (See *Kettering.*)	
3606	Von Schmidt, Peter - - -	Washington, D. C.
3601	Wade, Robert M. - - -	Summit Point, Va.
3655	Wager, James - - - -	Troy, N. Y.
3623	Walker, George - - -	New Haven, Ct.
3436	Walker, Richard, & Jefferson McIntire	Portsmouth, N. H.
3696	Wall, Arthur - - - -	Poplar, Blackwall, England.
3434	Walters, George T. - - -	Nicholasville, Ky.
3528	Ward, Hammond - - - -	Charlton, Mass.
3491	Waring, George E. - - -	Stamford, Ct.
3759	Waste, Oramel W. - - -	Pittsford, N. Y.
3421	Waterman, Stephen, and - -	Greenwich, Ct.
	Isaac D. Russel - - -	New York.
3423	Watkins, David - - -	Port Republic, Va.
3419	Watson, John - - - -	Lancaster, Engl'd; now residing in Elizabeth-town, N. J.
3625	Weaver, Daniel - - -	McKeansburg, Pa.
3577	Webb, Benjamin - - -	Warren, N. Y.
3617	Webster, James W. - - -	Luray, Va.
3420	Weisman, Joseph - - -	Philadelphia, Pa.
23	Wellstood, John G., assignee of Salathiel Ellis, (design) - - -	New York.
3663	Wemple, Jacob V. A., and - -	Mohawk, N. Y.
	George Westinghouse - -	Schoharie, N. Y.
3781	West, Christopher - -	Baltimore, Md.
3554	West, George B. - - -	Fairfield, Ohio.
3624	White, James - - - -	Milton, Pa.
3497	Whitman, Luther and Ezra - -	Winthrop, Me.
30	Whitney, Amaziah, (design) - -	Albany, N. Y.
3795	Whiton, Lyman - - -	Troy, N. Y.
3860	Wieting, Archibald - - -	Middletown, Pa.
3654	Wight, Oliver B. - - -	Sturbridge, Mass.
3706	Wilkinson, Thomas - - -	Cambridge, N. Y.
3797	Wilson, Alexander M. - - -	Rossville, N. Y.
3784	Wilson, Ebenezer - - -	Cincinnati, Ohio.
3839	Wilson, William - - -	Northampton, Mass.
3583	Wiszt, John A. - - -	Philadelphia, Pa.
3529	Wolfe, T. Jefferson - - -	Baltimore, Md.
3405	Wood, Simeon - - - -	Worcester, Mass.
3495	Wood, William - - -	Westport, Ct.
3814	Wood, Wm. A., & John C. Loveland -	Hoosick Falls, N. Y.
3520	Woodward, Lewis - - -	Medford, N. J.
3492	Woolley, John - - - -	Springfield, Mass.

O.—LIST OF PATENTEES—Continued.

No.	Patentees.	Residence.
3507	Woolley, John - - - -	Springfield, Mass.
3424	Worthington, Henry R. - -	New York.
3677	Worthington, Henry R. - -	New York.
66	Worthington, Henry R., (reissue) -	New York.
3835	Wright, Peter M. - - -	New York.
3517	Wyeth, Nathaniel J. - - -	Cambridge, Mass.
3630	Yale, Linus - - - -	Springfield, Mass.
3610	Young, Elisha W., and - -	Parkman, Ohio.
	Thomas H. Nelson - - -	Harrisburg, Penn.
3430	Young, James, and Elmon Parker -	Philadelphia, Penn.

P.—*List of patents expired during the year* 1844.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Adams, Nathaniel	Cornwall, N. Y.	Brick machine	June 22, 1830.
Aiken, Herrick	Dracut, Mass.	Brushes, cloth or hair	May 24, 1830.
Aiken, Herrick	Dracut, Mass.	Saw set	May 24, 1830.
Allen, Zachariah	Providence, R. I.	Nap, forming, on woollen cloth	February 2, 1830.
Allen, Zachariah	Providence, R. I.	Woollen cloth, finishing	February 23, 1830.
Ambler, J., jr., & Daniel C.	New Berlin, N. Y.	Grist mill, pressure or weights	December 6, 1830.
Andrews, Anson	Spencer, N. Y.	Dogs, iron, for saw mills	April 10, 1830.
Annesley, William	Albany, N. Y.	Timber, mode of uniting, for domes, bridges, &c.	November 6, 1830.
Annesley, William	Albany, N. Y.	Building vessels	November 6, 1830.
Archbald, William A.	New York	Sugar, manufacturing, from cane juice	April 19, 1830.
Archbald, William A.	New York	Sugar, raw or brown, from the juice of cane	April 19, 1830.
Archbald, William A.	New York	Sugar, raw or brown, from the juice of cane, or manufacturing sirup in wooden vessels	April 19, 1830.
Armistead, Thomas B.	Bloomfield, N. Y.	Pipes, aqueduct	April 15, 1830.
Armstrong, Abel D.	Springfield, Ohio	Plough, agricultural	January 15, 1830.
Arnold, Gilbert	Angelica, N. Y.	Grain, cleaning and dressing	June 17, 1830.
Arnold, James H., and J. Bonsall	Morristown, Ohio	Threshing machine	July 8, 1830.
Arnold, Robert C.	New Haven, Conn.	Washing machine	June 15, 1830.
Arnold, William E.	Haddam, Conn.	Washing machine	January 11, 1830.
Atwood, Anson	Salem, N. Y.	Fulling mill and power loom	October 1, 1830.
Atwood, Charles	Middletown, Conn.	Roll preserver, or mode of taking the wool from the doffers of the breakers	November 1, 1830.
Atwood, Charles	Middletown, Conn.	Slubbing, making woollen, called Atwood's twisting slubber	March 10, 1830.

Atwood, Charles	Middletown, Conn.	Spools, winding conical, for slubbing from the card	November 1, 1830.
Atwood, Henry C.	Woodbury, Conn.	Threshing machine	January 23, 1830.
Averill, Henry	Richland, N. Y.	Water wheel for propelling canal boats	October 1, 1830.
Averill, Henry	Richland, N. Y.	Water wheel for grist mills	October 21, 1830.
Babcock, Alpheus	Philadelphia, Penn.	Piano forte, cross stringing	May 24, 1830.
Bacon, Allyn	Philadelphia, Penn.	Suspender springs and cords	December 17, 1830.
Bacon, William	Philadelphia, Penn.	Loom, carpet and rug	April 7, 1830.
Baker, Elisha	Warwick, R. I.	Cotton whipper, revolving	June 4, 1830.
Baker, Job	New Bedford, Mass.	Spring-wire lock	October 1, 1830.
Bakewell, John P.	Pittsburg, Penn.	Wheels, glass, for clocks	October 1, 1830.
Baldwin, David	Queensbury, N. Y.	Friction rollers	October 1, 1830.
Ball, Daniel	Sandy Hill, N. Y.	Flax and hemp machine	July 7, 1830.
Bancroft, David	Grafton, Vt.	Bedstead, elevating, for the sick	October 12, 1830.
Barber John	Caroline, N. Y.	Cradle churn	January 28, 1830.
Barkley, William	Lebanon, Ky.	Distilling by steam	May 20, 1830.
Barnes, John	Kingston, Penn.	Washing machine, called the revolving steam washer	October 14, 1830.
Barney, Luther, & Abel A. Beach	Groton, N. Y.	Churn, double revolving	February 5, 1830.
Barney, Luther, & Abel A. Beach	Groton, N. Y.	Washer, revolving steam	February 5, 1830.
Barnitz, Charles A.	Spring Garden, Penn.	Oil, manufacturing, from the sunflower	October 20, 1830.
Barron, James	Norfolk, Va.	Fan for bed chambers, &c., moved by mechanism	November 27, 1830.
Batby, Antoine	New York	Pumps	May 16, 1830.
Beach Isaac	Dryden, N. Y.	Self-loading car	June 28, 1830.
Beach, Joseph	Middletown, Con.	Rice machine for hulling and working a trip hammer	October 1, 1830.
Beach, Timothy	Wilmington, Ohio	Propelling boats	April 2, 1830.
Beals Asa	Exeter, N. H.	Locks for doors and trunks	January 26, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Beard, Ebenezer	Charlestown, Mass.	Bee-hive slide	March 12, 1830.
Beckwith, Jedediah	Saratoga, N. Y.	Boring timber	December 21, 1830.
Beecher, Benjamin D.	Cheshire, Conn.	Threshing grain, shelling corn, cutting straw, &c.	October 20, 1830.
Bell, William H., and Timothy P. Andrews	Fortress Monroe, Va. Washington, D. C.	Stone breaking and threshing machine	July 9, 1830.
Bell, William H.	Norfolk, Va.	Locks, percussion and vent, for cannon	October 1, 1830.
Benedict, Philip	Lancaster, Penn.	Stove for stone coal	February 27, 1830.
Bettis, Andrew C., & Eli M. Gibbs	Norwich, N. Y.	Cooking stove	June 22, 1830.
Bisbee, Ziba	Bridgewater, Mass.	Staves, hoops, &c., machine for splitting	June 5, 1830.
Bladen, Thomas	Philadelphia, Penn.	Crackers, biscuits, &c., machine for cutting	March 16, 1830; re-issued October 1, 1830.
Blake, Elihu	New York	Apparatus for drawing milk from the breasts of women	April 24, 1830.
Blake, J., and D. Cushing	Providence, R. I.	Key for bedsteads	December 14, 1830.
Blake, Lemuel	Boston, Mass.	Types, making and using	March 12, 1830.
Blake, Philos	New Haven, Conn.	Tooth brushes	March 8, 1830.
Blank, Ephraim F., and Thomas Blank	New York	Leather paper	February 16, 1830.
Bloomer, Thomas	New York	Sawing and planing machine	November 3, 1830.
Bogardus, James	New York	Spinning cotton, flax, silk machine, &c.	May 25, 1830.
Bogardus, James	New York	Clocks	March 2, 1830.
Borden, Thomas	Newport, R. I.	Plough	January 13, 1830.

Bowen, Ethan	Providence, R. I.	Spinning machine, called the double spinner	July 13, 1830.
Boynton, Paul	Ogdensburg, N. Y.	Water wheel	April 20, 1830.
Branard, William H., and Chauncey H. Bulkley	Chatham, Conn.	Washing machine	October 16, 1830.
Brazier, Amable J.	Philadelphia, Penn.	Saccharifying rice and maize	October 1, 1830.
Brazier, Amable J.	Philadelphia, Penn.	Saccharifying rye and other grain, potatoes, &c.	October 1, 1830.
Brewster, Iram	Blenheim	Churn	May 28, 1830.
Brewster, Jonah	Worthington, Mass.	Boot crimper	March 23, 1830.
Briant, Germain	Richmond, Va.	Tobacco, stemming	November 11, 1830.
Bristol, Abner	Hillsdale, N. Y.	Churn, labor-saving	April 28, 1830.
Brown, Edward	Dover, N. H.	Reflector for lamps	October 1, 1830.
Brown, John	Providence, R. I.	Spinning machine, called the universal spinner	May 20, 1830.
Brown, Matthew D.	Mason county, Va.	Ferry boats	October 1, 1830.
Brown, William	New York	Tanning leather	November 11, 1830.
Bruce, George	New York	Music types, by combining printers' types	November 27, 1830.
Brundred, Benjamin	Oldham, N. J.	Throstle and spinning frame	May 7, 1830.
Bull, Aaron	Carlisle, Penn.	Tow lines for boats	January 30, 1830.
Burnass, Caleb B.	New York	Veneers, machine for sawing	December 14, 1830.
Burrall, Thomas D.	Geneva, N. Y.	Threshing and winnowing wheat and small grain	December 6, 1830.
Bushnell, Samuel, 2d	Saybrook, Conn.	Churn	December 20, 1830.
Bushnell, Samuel, 2d	Saybrook, Conn.	Washing machine	December 20, 1830.
Butcher, Robert	Philadelphia, Pa.	Spoons, from tin plate, pewter in sheets, sheet silver	December 27, 1830.
Butler, Lester, and Isaac Hinckley	Cobleskill, N. Y.	Tire bending	March 26, 1830.
Butts, Jehiel	Georgetown, S. C.	Threshing rice, machine for	May 20, 1830.
Cady, Eleazer	Canaan, N. Y.	Weighing boats and cargoes, called the tonnage meter	January 6, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Cannon, Morris	New Orleans, La.	Ague and fever specific	October 1, 1830.
Carleton, Ebenezer, and Solomon Whitney, jr.	Bath, N. H.	Sawing clapboards, lipping, &c.	March 25, 1830.
Carleton, Michael	Haverhill, N. H.	Percussion locks	December 23, 1830.
Carlock, William	Baltimore, Md.	Hats, machine for washing and cleaning	March 12, 1830.
Carpenter, E. W.	Lancaster, Penn.	Groove plane	January 30, 1830.
Carpenter, John B.	Henderson, N. Y.	Lever press, tackle windlass	January 30, 1830.
Carsley, Seth, 2d	Harrison, Me.	Shoemakers' last	April 2, 1830.
Carson, James	Raleigh, N. C.	Cotton press	November 4, 1830.
Carver, James A.	Taunton, Mass.	Window-blind fastener, gravitation	February 27, 1830.
Case, Jeremiah	Sodus, N. Y.	Smut machine	October 1, 1830.
Caustin, R. L.	Ledyard, N. Y.	Threshing machine	October 1, 1830.
Child, Ezra	Philadelphia, Penn.	Rotary steam engine	October 1, 1830.
Church, James, jr.	Hartford, Conn.	Spinning machine, called the long band	May 22, 1830.
Clark, Chester	Colebrookdale, Penn.	Threshing and hulling clover seed	January 28, 1830.
Clark, James, and Isaac Starks	Genoa, N. Y.	Threshing machine	January 20, 1830.
Clark, Joseph, and Henry Henderson	Baltimore, Md.	Crackers, biscuits, &c., machine for cutting	September 30, 1830.
Clark, Josiah R.	South Coventry, Conn.	Carpet loom	May 7, 1830.
Clark, Richard P.	Broadalbin, N. Y.	Columbian washer	April 16, 1830.
Clark, William	Pulteney, N. Y.	Spinning machine	October 1, 1830.
Clegg, William	Norwich, Conn.	Spools, or bobbins	February 24, 1830.
Clime, Samuel	New Britain, Penn.	Plough, combined	November 12, 1830.
Clowes, Charles L.	Union, Va.	Washing machine	February 27, 1830.

Cobbs, John P.	Nelson county, Va.	Plough, hill-side	October 1, 1830.
Coffin, William, jr	Hammondtown, N. J.	Window glass, cylinder, flattening	October 1, 1830.
Coffey, Reuben	Burke county, N. C.	Planting corn and peas	December 14, 1830.
Coffield, William	Norfolk, Va.	Ducks, mode of catching	January 18, 1830.
Colblyn, Alvan	Sharon, Vt.	Felloes, machine for sawing	October 15, 1830.
Cole, James	East Bloomfield, N. Y.	Boots and shoes, instrument for cutting channels for seams.	November 26, 1830.
Coleman, William	Euclid, Ohio	Grist mill, improvement on Haskin's	February 15, 1830.
Collier, William R.	Boston, Mass.	Types, casting and setting	February 9, 1830.
Conklin, James H.	Peekskill, N. Y.	Ploughshare, cast iron	January 30, 1830.
Cooley, Lenmon	Philadelphia, Pa.	Threshing machine, and hulling clover seed	November 11, 1830.
Cooper, Isaac	Baltimore, Md.	Boxes for hubs of wheels and ship's blocks	January 27, 1830.
Cooper, James	Augusta county, Va.	Threshing machine	April 12, 1830.
Cooper, James	Augusta county, Va.	Propelling machinery by animal power	April 12, 1830.
Cooper, James	Philadelphia, Pa.	Crackers, biscuits, machine for cutting	November 11, 1830.
Cooper, Peter	New York	Glue, manufacturing	April 29, 1830.
Copley, Josiah	Warrior March, Pa.	Spiral propeller for boats	May 22, 1830.
Cornell, Philip	Brutus, N. Y.	Knife sharpener, domestic	January 15, 1830.
Cornell, Philip	Brutus, N. Y.	Churning machine	October 1, 1830.
Corwilhe, William	New York	Threshing machine	March 23, 1830.
Couillard, Samuel	Boston, Mass.	Plates, punched, etched or engraved, wiping and polishing their exterior surface	October 9, 1830.
Crane, Jonathan	Schenectady, N. Y.	Circular saws	October 1, 1830.
Crary, Nathan, and Edw. P.	Albany Co., N. Y.	Pill boxes	April 6, 1830.
Cross, Archibald, and Ezra Brown	Cazenovia, N. Y.	Grinding flaxseed, paint, &c.	February 4, 1830.
Cross, Asahel	Cazenovia, N. Y.	Furnace, portable cooking	May 12, 1830.
Culver, Benjamin	Glastenbury, Ct.	Flour, vibrating machine for separating	October 6, 1830.
Cunningham, Thomas	Pittsburg, Pa.	Dock, floating dry	October 20, 1830.
Curtis, Asahel	Paris, N. Y.	Butter, machine for manufacturing	April 30, 1830.
Custer, Jacob D.	Norristown, Pa.	Clocks	November 24, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Danforth, Charles	Paterson, N. J.	Throstle for spinning	April 1, 1830.
Daniels, Chs., assignee of Wm. W. Southworth	Saybrook, Ct.	Screws of gimlets, cutting	March 30, 1830.
Darrah, James, and Jacob Kinsey	Cookstown, Pa. Ruscomb Manor, Pa.	Threshing and hulling clover seed	November 6, 1830.
Daskam, Nathaniel, and David G. Wood	Geneva, N. Y.	Crackers, ship bread, &c.	August 5, 1830.
Davis, Robert	Philadelphia, Pa.	Tow lines, apparatus for holding	November 11, 1830.
Davis, Samuel	New York	Cream, extracting from milk	October 1, 1830.
Dennison, Lester E.	Saybrook, Ct.	Pressing machine	October 1, 1830.
De Rivafinalo, Vincent, Charles Harseleben, and W. Davis	London, England	Gold ores and alluvial soils, machine for washing	November 1, 1830.
Dewey, Ebenezer	Butternuts, N. Y.	Churn, floating wheel	October 1, 1830.
Dewey, Joel, jr.	Troy, N. Y.	Threshing machine	January 29, 1830.
Dewey, Joel, jr.	Troy, N. Y.	Flax and hemp machine	November 25, 1830.
Dexter, Samuel F., and Samuel Graves	Auburn, N. Y.	Rope, cordage, and twine manufacturing	August 24, 1830.
Dickerman, Sereno, and Samuel M. Parsons	Meriden, Ct.	Churn	October 1, 1830.
Dickinson, David	Chatham, Ct.	Scouring clothes	October 1, 1830.
Disbrow, Levi	New York	Boring earth for water	November 1, 1830; reissued October 20, 1843.
Disbrow, Levi	New York	Kitchen grate	November 22, 1830.

Douglass, James, and Walter Johnson	Attica, N. Y.	Threshing machine	May 14, 1830.
Douglass, John C.	New York	Boilers, steam engine	December 17, 1830.
Dunbar, Amasa	Sharon, Mass.	Boot crimper	February 19, 1830.
Dunscomb, Edward	New York	Railroads	July 13, 1830.
Durfee, Samuel	Providence, R. I.	Door fender	October 1, 1830.
Dyer, Joseph C.	Manchester, England	Speeder, twisting, improvem't on Danforth's	October 1, 1830.
Eastman, Joel, and Chs. Abbot	Bath, N. H.	Screws, machine for cutting and turning steel, iron, &c.	December 23, 1830.
Eastman, Joel, and Guy C. Rix	Bath, N. H.	Wheels for carriages	December 23, 1830.
Eaton, Isaiah	Boston, Mass.	Springs for doors	February 24, 1830.
Eells, Samuel, 2d	Middletown, Ct.	Boots and shoes, water-proof	April 23, 1830.
Elgar, John	Baltimore, Md.	Railroad car	October 1, 1830.
Ennis, Joshua	Brooklyn, N. Y.	Chimneys, ventiduct, topping	October 1, 1830.
Eslin, John	Philadelphia, Pa.	Furnace for burning stone coal or charcoal	June 19, 1830.
Ewbank, Thomas	New York	Explosion of steam boilers, preventing, by detector	June 8, 1830.
Ewing, John	Worcester, Mass.	Churn	January 29, 1830.
Fahrney, Samuel	Washington co., Md.	Sausage stuffing machine	February 16, 1830.
Fairfield, Josiah	Vassalborough, Me.	Shingles and scaleboard machine	April 28, 1830.
Fairlamb, Josiah	Newcastle, Del.	Planes, revolving, for crossing railroads	July 7, 1830.
Fairlamb, Jonas P.	New York	Inking forms of types or letters	October 25, 1830.
Fairman, Simon	Nassau, N. Y.	Carriage, land and steam	March 27, 1830.
Fessenden, Thomas G.	Charlestown, Mass.	Portable stove, steam and hot water	December 14, 1830.
Flagg, David, jr.	Gardiner, Me.	Sawing boards	January 19, 1830.
Flagg, David, jr.	Gardiner, Me.	Threshing machine	June 4, 1830.
Flagg, David, jr.	New York	Threshing machine	July 10, 1830.
Flagg, David, jr.	New York	Threshing small grain, called Flagg's rotary thresher	November 29, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Flagg, David, jr.	New York	Grates, revolving, for grating apples and other vegetables	December 20, 1830.
Finlay, John	Baltimore, Md.	Iron wheel for railroad carriages	March 4, 1830.
Fisher, Charles F.	York, Penn.	Distilling, art of	April 24, 1830.
Fisher, Samuel, & David Sperry	Amsterdam, Va.	Threshing machine	May 19, 1830.
Folton, Samson	Huntington, Penn.	Plough	November 1, 1830.
Foot, Aaron H.	New London, Mass.	Saws, cross-cut circular	July 14, 1830.
Foote, Alvan	Greenville, Ohio	Washing machine	December 7, 1830.
Forker, Samuel	Meadville, Penn.	Percussion lock	February 13, 1830.
Foster, Abner	Phillipstown, Mo.	Mortising machine	April 28, 1830.
Foster, Jesse, and Joseph Stoudenburgh	Green county, N. Y.	Woollen garments, manufacturing, without spinning or weaving	April 20, 1830.
Freeman, John	Senate, N. Y.	Washing machine for cleaning cloths and clothes	October 14, 1830.
Fyler, Barton N.	Bradford, Vt.	Grinding grain, hulling cotton seed, rubbing down whetstones, &c.	April 15, 1830.
Gallaher, Thomas	Liverpool, Penn.	Distilling	December 14, 1830.
Gambell, Squire	Onondaga, N Y.	Threshing machine	June 24, 1830.
Gammond, Edmund	Gorham, Me.	Brads, cutting and manufacturing, from iron plates	October 20, 1830.
Gardiner, Morris J.	Yorkborough, Penn.	Turning lathe	December 14, 1830.
Gardner, Phineas	Woodville, Mass.	Cotton-gin saw	April 22, 1830.
Gates, James M.	Norwich, Conn.	Washing machine	May 21, 1830.
Gentry, Joseph C.	Philadelphia, Penn.	Power, portable machine, &c.	December 14, 1830.

Gilpin, Thomas	Philadelphia, Penn.	Paper finishing machine	June 25, 1830.
Geraud, John J.	Baltimore, Md.	Boilers, steam, stoves, chimneys, &c.	March 8, 1830.
Geraud, John J.	Baltimore, Md.	Fire engine	November 11, 1830.
Goodrich, Charles B.	Rutland, Mass.	Staves, machine for dressing	May 10, 1830.
Goodrich, Charles B.	Rutland, Mass.	Staves, machine for jointing	May 20, 1830
Gorgas, Jacob	Fredericksburg, Penn.	Clover seed, machine for shelling	January 15, 1830.
Gould, Abijah	Henrietta, N. Y.	Clocks	October 1, 1830.
Gould, Marcus T. C.	Philadelphia, Penn.	Pen fountain, self-supplying	October 1, 1830.
Goulding, John	Dedham, Mass.	Loom, making and using	July 7, 1830.
Granger, Moses	Syracuse, N. Y.	Churn	July 14, 1830.
Grater, George W.	Boston, Mass.	Lever andp ully power applied to a standing press	October 1, 1830.
Greenwood, Cyrus	Winchester, N. H.	Spinning jenny for unfurling condensed woollen roping	February 13, 1830.
Gregory, Alanson P.	Ithaca, N. Y.	Hats, scalding and napping	May 13, 1830.
Griswold, Ephraim	Truxton, N. Y.	Grist mill	October 16, 1830.
Graff, Joseph,	Rapho, Penn.	Nap and card machine, Fuller's	February 10, 1830.
Grover, Hosea H.	Springwater, N. Y.	Scale, compound lever and self-weighing	December 17, 1830.
Grut, Benjamin	New York	Hats, making of paper, water-proof	October 1, 1830.
Haggerty, Wm., Cha. Lawrence, and Thos. Fraser	New York	Furnace, portable cooking	May 22, 1830.
Hale, Ebenezer R.	Hyde Park, N. Y.	Rotary pumps	July 14, 1830.
Halliday, J., T. Eldridge, C. Gibbs, & T. D. Smith	Hartford, N. Y.	Flax machine	May 4, 1830.
Hamilton, James	New York	Wood saws	June 10, 1830.
Hammond, James, & John McClelland	Williamsport, Penn.	Loom, cassinet	July 3, 1830.
Hampton, Jesse	Lexington, Ky.	Preserving meats and fruits	March 12, 1830.
Hanson, David D.	Ware, N. H.	Felloes, machine for sawing	October 20, 1830.
Hara, John O., assignee of John L. Dagg	Philadelphia, Penn.	Calendars	May 4, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Harris, Charles	Snowhill, Ohio	Wool, washing, on the sheep	October 1, 1830.
Harris, E. B., and Andrew R. Arnold	Woodstock, Conn.	Temples, revolving bar	April 13, 1830.
Hawley, William C.	Brookfield, Conn.	Fan mill	October 1, 1830.
Hayden, Festus	Waterbury, Conn.	Buttons, American wire-eyed	October 1, 1830.
Hayward, Levi	Phelps, Mass.	Smut machine	April 12, 1830.
Hearsey, Joseph	Wareham, Mass.	Nail manufactory; reed machine	May 13, 1830.
Heberling, John	Harrison county, Ohio	Horse power	October 28, 1830.
Heintzleman, John J.	Philadelphia, Penn.	Truss, spiral spring	February 16, 1830.
Henderson, John W., and John E. Cayford	Milburn, Me.	Water wheel, reacting	April 14, 1830.
Henning, George	Ithaca, N. Y.	Hats, sizing and napping	April 28, 1830.
Heston, William	Philadelphia, Penn.	Locomotive carriages	October 11, 1830.
Hinds, Stephen	Montrose, Penn.	Washing machine, Susquehannah	May 27, 1830.
Hinckley, Benjamin	Fayette, Me.	Veneers, glueing, on columns	April 27, 1830.
Holmes, Elisha H.	Norwich, Conn.	Mud machine for beds of streams, rivers, and harbors	November 18, 1830.
Honeywell, Enoch	Broadalbin, N. Y.	Elevator, water	July 10, 1830.
Horton, Ebenezer	Avon, N. Y.	Washing machine, improvement on Slater's	June 17, 1830.
Hotchkiss, John G.	Cincinnati, Ohio	Rotary engine, propelling	October 1, 1830.
Hovey, William	Boston, Mass.	Plane irons	March 10, 1830.
Howard, William H.	Worcester, Mass.	Loom, vibrating cam	February 12, 1830.
Howell, Francis B.	Lockport, Ohio	Paper-cutting machine	May 21, 1830.
Hoyt, William	Vernon, Ind.	Corn-shelling machine	December 17, 1830.
Hughes, Joseph Y.	Pottsville, Penn.	Carriage, railroad	June 25, 1830.

Hull, Alonzo G.	Troy, N. Y.	Bed, elastic spring, with an elevating and depressing surface	October 1, 1830.
Humphrey, Rufus	Victor, N. Y.	Threshing machine	December 27, 1830.
Hunt, Seth	Syracuse, N. Y.	Purifying salt water	January 23, 1830.
Hurd, Joseph, jr.	Boston, Mass.	Cloth-drying machine, called the evaporating shaft	January 23, 1830.
Hurd, Merritt	Augusta, N. Y.	Bark mill	February 1, 1830.
Hurd, Thomas, and Jesse Fox	Lowell, Mass.	Nap, raising, on woollen cloth, by threshing	June 23, 1830.
Hyde, Douglass	Reading, Penn.	Pen fountain	May 20, 1830.
Hyde, Stephen	Williamsburg, Mass.	Axes, oval	January 29, 1830.
Ingersoll, Erastus	Farmington, Mich.	Mowing machine	May 7, 1830.
Ingersoll, Thomas	Murray, N. Y.	Threshing machine	December 14, 1830.
Irwin, John	Coventry, R. I.	Spindle still, and can roping machine	March 26, 1830.
Ives, Joseph, and James Walters	Brooklyn, N. Y.	Springs of carriages, and attaching carriage bodies to them	October 6, 1830.
Jarves, Denning	Boston, Mass.	Moulds for glass makers	May 28, 1830.
Jarves, Denning	Boston, Mass.	Glass knobs, manufacturing	October 19, 1830.
Jennings, Isaiah	New York	Lamp for burning tallow and other fatty substances	May 20, 1830.
Jennings, Isaiah	New York	Light, its application to lamps, with or without wicks	October 16, 1830.
Jennings, Joseph	New York	Cooking apparatus	May 14, 1830.
Jessup, George	Troy, N. Y.	Threshing machine, improvement on Ballou's	December 14, 1830.
Jewett, John	Dudley, Mass.	Cloth, passing and stretching cloth over a revolving cylinder, with teazles	December 30, 1830.
Johnson, Henry	Sidney Plains, N. Y.	Saws, cross-cut and saw-mill, gumming the teeth of	December 23, 1830.
Johnson, James	Fairbanks township, O.	Water wheel	October 1, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Jones, Daniel	Granville, N. C.	Gold, separating from earths	November 3, 1830.
Jones, Samuel	Bridgeport, Penn.	Wagon lock	May 4, 1830.
Jones, Samuel T.	Philadelphia, Penn.	Car, pendulous railroad	February 22, 1830.
Jones, Samuel T.	Philadelphia, Penn.	Car, railway, to run on roads and streets	February 22, 1830.
Jordon, Henry	Lexington, Ky.	Gold, digging and procuring	October 1, 1830.
Kearsing, Thomas, H. O., G. T., and William F.	New York	Piano forte	June 13, 1830.
Kennedy, John	Baltimore, Md.	Soap, manufacturing by steam	October 1, 1830.
Kennedy, Samuel	New York	Moulding, machine for cutting	April 10, 1830.
Keaton, Levi	Philadelphia, Penn.	Leather, silvering and gilding	June 21, 1830.
King, P. L., and E. Blasdell	Sparta, Ia. Lawrenceburg t'p, Ia.	Carding machine, called the fancy card	October 14, 1830.
King, Roswell	McIntosh, Ga.	Gold washer, vertical, cylindrical	October 1, 1830.
Kingsbury, Hezekiah	Hebron, Conn.	Churning and washing machine	June 26, 1830.
Kingsbury, Rhodes	Bath, Me.	Screw, cog, for shives of ships' blocks	May 22, 1830.
Kirkpatrick, Andrew	Urbanna, Ohio	Washing machine	May 21, 1830.
Klauberg, Daniel	New York	Spring scale	June 12, 1830.
Knight, James	Baltimore, Md.	Truss	December 14, 1830.
Krauss, Andrew and Joel	Upper Milford, Penn.	Plaster, lime, &c., spreading on land	October 16, 1830.
Lamson, Daniel	Perrysburgh, N. Y.	Distilling whiskey from corn	October 1, 1830.
Lane, Samuel	Hallowell, Me.	Railway, endless chain	May 17, 1830.
Langford, Charles	Claridon, Ohio	Grist mill	July 8, 1830.
Laning, Samuel	Camden, N. J.	Apples, machine for gathering	November 1, 1830.
Laporte, Peter	Augusta county, Va.	Cloth, manufacturing of wire and flax	July 12, 1830.

L'Hommedieu, Ezra	Saybrook, Conn.	Hammers and spikes, gimlets, &c., machine for making	April 28, 1830
L'Hommedieu, Ezra	Saybrook, Conn.	Augers, single twist	October 1, 1830.
Lemont, Archibald	Pittsburg, Penn.	Dies and taps	January 29, 1830.
Leonard, John, jr., J. S. Brainard, and A. Sizer	Wallingford, Conn.	Moulds for casting iron, brass, &c.	January 28, 1830.
Lester, Ebenezer	Killingworth, Conn.	Fireplace	June 21, 1830.
Lester, Ebenezer	Killingworth, Conn.	Washing machine	December 20, 1830.
Lewis, H. L. B.	Buffalo, N. Y.	Propelling canal boats by a lock paddle wheel	November 2, 1830.
Lewis, Ichabod	Irville, Ohio	Chair manufacturing machine, called the mechanics' assistant	May 25, 1830.
Lewis, Thomas C.	Pittsburg, Penn.	Malleable iron, manufacturing from pig	October 1, 1830.
Liebenau, Henry	New York	Monuments, memento plates, mantel-pieces, casting	November 17, 1830.
Lindsey, Noah	Catskill, N. Y.	Threshing machine	May 7, 1830.
Little Archibald	Bridgeton, N. J.	Spoons, making	December 14, 1830.
Littleboy, M. J.	Philadelphia, Penn.	Combs, manufacturing horn and tortoise-shell	November 19, 1830.
Long, George W.	Fort Jackson, La.	Bridges, frame	March 10, 1830.
Long, Stephen H.	Baltimore, Md.	Bridges, wooden or frame	March 6, 1830.
Longhead, Joseph, and J. B. Chapman	Philadelphia, Penn.	Explosion guard, for steamboats	June 11, 1830.
Lothian, George B.	New York	Music types, cutting and casting	August 11, 1830.
Lowe, Jonathan	Vienna, N. Y.	Bedstead, called the metamorphosic alleviator	October 25, 1830.
Lowell, Gideon	Nunda, N. Y.	Washing machine	November 6, 1830.
Lupton, Amos, Jacob Janney, and John Lupton	Frederick county, Va.	Threshing machine	July 28, 1830.
Lynch, John N.	Dillsburg, Penn.	Laths, machine for cutting	February 16, 1830.
Mallory, Ogden	Oswego, N. Y.	Steam engine and feeder for the boiler	December 28, 1830.
Manley, Gervase B.	Canton, Mass.	Nails, manufacturing wrought	December 14, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Manning, William	Westfield township, Pa.	Clover seed, rice, barley, &c., hulling	November 24, 1830.
Markland, William	New York	Tops, pepper and ink	October 1, 1830.
Marsh, Seymour	Canajoharie, N. Y.	Truss	March 29, 1830.
Mason, Samuel P.	Leesville, Conn.	Speeder for spinning cotton roping	June 24, 1830.
Mason, Sam'l P., (reissue)	Leesville, Conn.	Speeder for making cotton roping	June 24, 1830; reissued December 29, 1830.
McCord, Enoch D.	Sandy Hill, N. Y.	Vice, stock and hand	October 1, 1830.
McCormick, Robert	Rockbridge county, Va.	Flax and hemp machine	October 1, 1830.
McCormick, Robert	Rockbridge county, Va.	Hydraulic machinery	October 1, 1830.
McGann, John	Kensington, Penn.	Glass bottles, &c., and other pressed hollow glass ware, &c.	November 26, 1830.
Meigs, Phineas, and M. C. Arnold	Madison, Conn.	Planting and digging potatoes, &c.	November 3, 1830.
Mettee, Martin	Baltimore, Md.	Pumps	May 20, 1830.
Miller, Ezra L.	Charleston, S. C.	Boilers, vertical, of locomotive engines, &c.	June 21, 1830.
Miller, Rudolph	Marietta, Penn.	Threshing machine	March 15, 1830.
Miller, Samuel K.	Elizabethtown, N. J.	Bands for hubs of wheels	October 7, 1830.
Mitchell, Adam	Washington co., Tenn.	Plough, bar-share	October 1, 1830.
Mobley, Eli	Fredericktown, Md.	Saw mill	June 5, 1830.
Moore, John	Ackworth, N. H.	Cooking stove	May 7, 1830.
Moorehouse, Stephen P.	Ludlowville, N. Y.	Lamp, lard	April 26, 1830.
Morris, Benjamin	Binghamton, N. Y.	Lever press	February 2, 1830.
Morris, William, and Jabez Spinks	Kenawha, Va.	Boring earth for water	October 22, 1830.

Morrison, Wm., and George Tomb	Jersey Shore, Pa.	Floating excavator	August 25, 1830.
Moyer, Daniel	Cootstown, Pa.	Threshing machine, improvement on Warren's	February 10, 1830.
Mudge, Elisha	Genesee county, N. Y.	Mortising and tenoning machine	October 1, 1830.
Neal, Jesse, assignee of Phineas Pettes	Middlebury, Ohio	Grain, scouring	July, 2, 1830.
Newbury, Joel	Poughkeepsie, N. Y.	Percussion locks, concealed	April 27, 1830.
Newsom, Thomas G., and James C. Schule	Nashville, Tenn.	Propelling machinery by horse power	December 14, 1830.
Newton, Joseph	Sweden, N. Y.	Saw-mill machinery	October 1, 1830.
Newton, Phineas	Sidney, N. H.	Saws, cross-cut or saw-mill, gumming the teeth	June 19, 1830.
Nichols, Ethan H., and Thaddeus Fairbanks	St. Johnsbury, Vt.	Flax and hemp dresser	October 1, 1830.
Nisbet, Samuel	Toboyne township, Pa.	Plough	May 25, 1830.
Norton, John L,	Charleston, S. C.	Rice and barley machine	May 7, 1830.
Norton, Myron	Goshen, Ct.	Cheese pressing machine	October 13, 1830.
Oothoudt, John	Lebanon, N. Y.	Churn, oval	May 10, 1830.
Orrick, William B.	Reading, Pa.	Carriage, railroad	March 2, 1830.
Otis, Ephraim R.	Riverhead, Ct.	Temples, self-operating	April 2, 1830.
Ott, George	Norfolk, Va.	Soda water apparatus	June 18, 1830.
Ottinger, William	Whitemarsh, Pa.	Threshing machine	October 1, 1830.
Overhall, Israel	Liberty, West Tenn.	Boring rocks	April 23, 1830.
Overman, Benjamin	Greensborough, N. C.	Sawing, mortising, tenoning, boring, and grooving machine	May 27, 1830.
Palmer, Gideon	Mountville, Ct.	Oil, extracting from cotton seed	December 14, 1830.
Palmer, Gideon	Mountville, Ct.	Oil, tobacco, and cotton press	December 14, 1830.
Parker, Amos	Sweden, Me.	Brick and mortar machine	March 5, 1830.
Parmlee, David	Reading, Ct.	Grinding apples, corn, bark, &c.	March 4, 1830.
Parmlee, Leeman	Poughkeepsie, N. Y.	Raising water	October 1, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Parsons, Samuel M., and S. Dickerman	Meriden, Ct.	Churn	October 1, 1830.
Patton, John M.	Milton, Pa.	Steam navigation	February 4, 1830.
Pawling, Charles	Gregg township, Pa.	Plough	May 21, 1830.
Pearce, John	Yorkshire, N. Y.	Spinning machine, farmers' handy maid	June 30, 1830.
Peltier, Felix	New York	Propelling vessels	October 1, 1830.
Pendergast, John G.	Palmyra, N. Y.	Oil and spirit of turpentine, preparing for paint	July 9, 1830.
Pennock, Moses	East Marlborough, Pa.	Boots and shoes, manufacturing	December 14, 1830.
Perkins, Elisha	Baltimore, Md.	Blister plaster	January 15, 1830.
Peters, John	Harrisburg, Pa.	Threshing machine	June 12, 1830.
Petersburg Manufacturing Company, assignees of Alanson Pond	Petersburg, Va.	Seine twine and small cordage	May 20, 1830.
Peterson, Lewis and Peter	Pittsburg, Pa.	Cooking stove	May 29, 1830.
Phelps, Russell	Andover, Mass.	Propelling speeder in spinning wool	December 31, 1830.
Phelps, William	Salem, Mass.	Spring catch, horizontal, for window blinds	July 7, 1830.
Phillips, Benjamin	Philadelphia, Pa.	Cylinder for propelling vessels	January 23, 1830.
Philips, Palmer	Busti, N. Y.	Tubs, manufacturing	May 20, 1830.
Phyfe, William F.	New York	Window and bed curtains	February 19, 1830.
Phyfe, William F.	New York	Hair mattresses	October 1, 1830.
Pierpont, John	Boston, Mass.	Fireplace, Doric	January 8, 1830.
Pierce, Joshua, Joseph Whitley, and Aaron S.	Candor, N. Y.	Dogs, iron, for saw mills	April 13, 1830.

Pitts, James, Cyrus Houghton, and J. Rice, jr.	Lancaster, Mass.	Combs, machine for making, called a grinding comb stock, &c.	October 1, 1830.
Poiteaux, Michael B.	Richmond, Va.	Machinery for mills	May 20, 1830.
Pollock, John	Hopewell, Penn.	Car, self-adjusting railroad, street	July 7, 1830.
Pool, John, jr.	Easton, Mass.	Protractor and tablet, geometrical	June 16, 1830.
Porter, Aaron	New London, Ind.	Grist mill	March 10, 1830.
Porter, John C.	Powhatan county, Va.	Brick, moulding and tempering clay	December 29, 1830.
Post, John W., and Calvin Post	Washington, D. C.	Drilling rocks	February 2, 1830.
Post, John W.	Washington, D. C.	Drilling and blasting rocks	October 1, 1830.
Potts, Charles	Philadelphia, Penn.	Steam engines	May 31, 1830.
Powell, Thomas	Baltimore, Md.	Steam engine, rotary	October 1, 1830.
Pratt, Julius, (disclaimer, April 27, 1837)	Meriden, Conn.	Combs, ivory, bone, and wood	December 28, 1830.
Preston, Titus	Wallingford, Conn.	Straw cutter	October 1, 1830.
Prim, William	Lebanon, Penn.	Saw and grist mill	October 6, 1830.
Prince, John	New York	Ink distributor, self-moving	April 23, 1830.
Pritchard, E. B.	Scriven county, Ga.	Flutter wheels, applying water to	May 31, 1830.
Punchard, Thomas H.	Boston, Mass.	Crimping boot fronts	May 8, 1830.
Quimby, Aaron B.	Hagerstown, Md.	Explosion of steam boilers, preventing	October 1, 1830.
Ravenal, John	Charleston, S. C.	Rice, machine for cleaning	January 29, 1830.
Read, John M.	New York	Cradle, or crib	February 27, 1830.
Reeves, Benjamin	Philadelphia, Penn.	Steam and other engines	February 6, 1830.
Rhodes, Elias	Kingsbury, N. Y.	Lathe	November 11, 1830.
Rice, Charles	Barre, Mass.	Cider mill	November 11, 1830.
Rice, Thomas	Petersburg, Va.	Twine, cotton seine	October 1, 1830.
Rich, John, jr.	Troy, N. Y.	Flax and hemp machine	May 20, 1830.
Rich, Martin	Candor, N. Y.	Iron dogs for saw mills	February 19, 1830.
Rich, Martin	Candor, N. Y.	Iron dogs for saw mills	April 13, 1830.
Roberts, Asher W.	Hartford, Conn.	Furnace for tailors	May 28, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Robinson, Jacob	Lancaster, Penn.	Sausage cutter	February 27, 1830.
Robinson, Eben, and N. C. Tiffany	Caroline, N. Y.	Churn	December 14, 1830.
Rodgers, Andrew	Middletown, Penn.	Chain paddle wheel	April 6, 1830.
Rogers, John A.	Augusta, Me.	Locks	January 20, 1830.
Ronaldson, James, and Jno. N. Neill	Philadelphia, Penn.	Marine railway, foundation of	May 22, 1830.
Ross, William	Pennfield, N. Y.	Threshing machine	April 1, 1830.
Rundle, Thomas	Boston, Mass.	Cloth mangle machine	November 11, 1830.
Sackmeister, Charles P.	New York	Piano-forte	May 17, 1830.
Salisbury, Amos	Troy, N. Y.	Rope and cordage, preserving	November 1, 1830.
Sanderson, Isaac	Milton, Mass.	Pasteboard for bandboxes, &c.	May 15, 1830.
Sands, Ephraim	Cincinnati, Ohio	Rice, machine for threshing	May 24, 1830.
Sands, Marcellus	Franklin, N. Y.	Mortising and boring machine	October 1, 1830.
Sanford, N. C., and E. P. Parmelee	Meriden, Conn.	Rake, iron teeth	June 8, 1830.
Sanno, Frederick D.	Philadelphia, Penn.	Gold, separating from earths	December 24, 1830.
Savage, Anthony	Pottsville, Penn.	Stove for anthracite coal	June 10, 1830.
Sawyer, Augustus	Hopewell, N. Y.	Machinery for mills, threshing machine	October 1, 1830.
Scott, John	Philadelphia, Penn.	Chests, fire-proof	November 12, 1830.
Scott, Thomas M.	Falls township, Penn.	Candles, manufacturing dipped	April 1, 1830.
Scott, William K.	Sandy Hill, N. Y.	Flax and hemp machine	February 11, 1830.
Seabury, Charles S.	New York	Piano forte	May 20, 1830.
Sears, David	Franklin, N. Y.	Fanning mill	May 24, 1830.
Senueff, Jacob	Philadelphia, Penn.	Weavers' reeds	October 1, 1830.

Seybert, Henry, and L. Vanuxem	Philadelphia, Penn.	Acids, margaric, stearic, &c., decomposed by caustic lime	August 16, 1830.
Sharman, Hazard	Scriba, N. Y.	Lever press	November 1, 1830.
Shaw, Moses	New York	Blasting rocks	January 3, 1830.
Sheffield, Thomas	Greene county, N. Y.	Raising vessels by means of sliding ways	May 8, 1830.
Shepherd, Forrest	Belmont county, Ohio	Ointment, improvement on Judkins's	July 9, 1830.
Sherwood, William	Somersworth, N. H.	Carpeting, ingrain, taking figures of	April 20, 1830.
Sherwood, William	Worcester, Mass.	Loom, ingrain carpet	January 20, 1830.
Shiveley, Henry, and R. S. McEwen	Fredericksburg, Ohio	Churn	March 6, 1830.
Short, Sewell, and Noah Bradford	Barnstable, Mass.	Explorer, submarine	February 18, 1830.
Shreve, Henry M.	Louisville, Ky.	Steam boilers	April 21, 1830.
Shugert, John	Quincy, Mass.	Paper-cutting machine	December 14, 1830.
Silliman, Samuel	Saybrook, Conn.	Washing machine, vibrating	February 3, 1830.
Simmons, James S.	Scituate, R. I.	Cotton whipper, cylindrical grate	October 1, 1830.
Skinner, Elijah	Sandwich, N. H.	Locks, saving, for locking drawers	April 13, 1830.
Skinner, Elijah	Sandwich, N. H.	Baking iron	October 1, 1830.
Slater, Samuel	Philadelphia, Penn.	Threshing and winnowing machine	October 1, 1830.
Slover, Asher, and William Sperry	New York	Threshing machine	June 29, 1830.
Smith, Abel, and James Olney	Westmoreland, N. Y.	Flax and hemp, machine for dressing	July 10, 1830.
Smith, Alonzo L.	Brutus, N. Y.	Threshing machine	November 24, 1830.
Smith, Andrew P.	Cornwall, Conn.	Tenons on spokes of wheels, machine for cutting	November 1, 1830.
Smith, Avery	Milo, N. Y.	Bedstead for the sick	July 12, 1830.
Smith, Franklin G.	Lynchburg, Va.	Steam navigation machinery	October 12, 1830.
Smith, Isaac W.	Lockport, N. Y.	Catholicon, chemical	May 28, 1830.
Smith, James, and Samuel C. Whistler	Rockingham co., Va.	Gold, separating and grinding	January 15, 1830.

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P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions or discoveries.	When issued.
Smith, Jesse C.	Wheeling, Va.	Grist mill	January 9, 1830.
Smith, John A.	Windham, Conn.	Pumps, package	February 3, 1830.
Smith, Moses	New York	Compass needle, marine and surveying	June 15, 1830.
Smith, William W.	Rochester, N. Y.	Raising canal boats, ships, &c.	February 23, 1830.
Snyder, John	Tuscarora, N. Y.	Augers, boring and withdrawing	June 1, 1830.
Somerby, Theophilus	Nantucket, Mass.	Hydraulics	October 1, 1830.
Sowle, George, and Peter Brewer	Blenheim, N. Y.	Churn	March 22, 1830.
Spear, Phineas	Portland, Me.	Quadrant and sextant	March 19, 1830.
Sperry, David, and Samuel Fisher	Amsterdam, Va.	Threshing machine	May 19, 1830.
Sperry, William, and A. Slover	New York	Threshing machine	June 29, 1830.
Spinks, Jabez, and William Morris	Kenawha, Va.	Boring earth for water	October 22, 1830.
Standish, John	Providence, R. I.	Loom or improvement on weaving	November 11, 1830.
Standish, John	Providence, R. I.	Temples of the common loom	November 11, 1830.
Starks, Isaac, and James Clark	Genoa, N. Y.	Threshing machine	January 20, 1830.
Stearns, Abner, jr.	Scaghticoke, N. Y.	Staves, machine for heading and dressing	March 22, 1830.
Steele, Austin	Waterbury, Conn.	Roping or slubbing, making woollen	April 1, 1830.
Stem, David	Vanderburg county, Ia.	Sawing timber	December 14, 1830.
Stevens, A. H.	Richland, N. Y.	Hat bodies, forming	January 27, 1830.
Stimpson, James	Baltimore, Md.	Propelling carriage on railroad by horse power	February 16, 1830.

Stimpson, James	Baltimore, Md.	Propelling carriages on railroads by timber	June 3, 1830.
Stocking, David	Scott, N. Y.	Washing machine	June 25, 1830.
Stoudenburg, James, and Jesse Foster	Greene county, N. Y.	Woollen garments, manufacturing without spinning or weaving	April 20, 1830.
Stoudinger, George	Newark, N. J.	Rolling mill, steel for carriage springs	July 17, 1830.
Stowell, Abel	Medford, Mass.	Baking or cooking	December 14, 1830.
Stowitts, John	Gorham, N. Y.	Threshing machine	July 13, 1830.
Stratton, James	Greenfield, Mass.	Baggage, securing, on post coaches	June 29, 1830.
Summey, Peter	Lincoln, Mass.	Gold, washing and separating alluvial	May 22, 1830.
Sutton, Benjamin	Romulus, N. Y.	Propelling carriages on railway, tread-wheel	January 27, 1830.
Sutton, William	Geneva, N. Y.	Churn, double dasher	October 1, 1830.
Syme, John M.	Richmond, Va.	Dams, mode of constructing	February 22, 1830.
Tallcott, Jared G.	Glastenbury, Conn.	Brick, press	October 1, 1830.
Tam, Samuel C.	Milton, Del.	Harrow teeth, fluke	March 30, 1830.
Tenny, Amos T.	New Woodstock, N. Y.	Washing machine for clothes and scouring yarn	November 23, 1830.
Tenny, Daniel	Plattsburg, N. Y.	Hat-body machinery, called the sagging apron	October 1, 1830.
Terry, Silas B.	Plymouth, Conn.	Springs, combined spiral, applied to clocks	November 3, 1830.
Thomas, Elihu H., and Nathan Woodcock	Brattleborough, Vt.	Pulp dresser	August 11, 1830.
Thomas, William	Pomfret, N. Y.	Staves, dressing	October 7, 1830.
Thompson, Charles	Poughkeepsie, N. Y.	Window sashes, making	December 6, 1830.
Thompson, Jesse	New York	Piano forte, upright	October 1, 1830.
Thompson, Jonathan	Ashtabula, Ohio	Flouring mill	July 7, 1830.
Thompson, Samuel	Washington, Ohio	Ornamenting columns, chairs, &c.	October 1, 1830.
Thorp, John	Providence, R. I.	Spinning cotton yarns	November 11, 1830.
Thruston, Edward	New York	Threshing grain, shelling corn	November 1, 1830.
Thurber, Hezekiah	Painted Post, N. Y.	Washing machine	April 22, 1830.
Tiers, Cornelius, and Joseph Myers	Philadelphia, Penn.	Tiller wheel	January 18, 1830.

P.—LIST OF EXPIRED PATENTS—Continued.

Names of patentees.	Residence.	Inventions of discoveries.	When issued.
Tiffany, Nathaniel C., and E. Robinson	Caroline, N. Y.	Churn	December 14, 1830.
Todd, Henry	Pembroke, N. H.	Planting corn, &c.	October 1, 1830.
Tomb, George, and William Morrison	Jersey Shore, Penn.	Excavator, floating	August 25, 1830.
Tomlinson, William A.	New York	Beef, salted, mode of making and curing	December 14, 1830.
Tompkins, Caleb	Montgomery, Ala.	Steam engine, rotary, and boiler	November 30, 1830.
Toms, Daniel	Auburn, N. Y.	Staves, sawing	May 2, 1830.
Toms, Daniel	Auburn, N. Y.	Staves, sawing, jointing, and smoothing	July 8, 1830.
Tuck, Davis G.	Halifax county, Va.	Tobacco, drying and curing	October 1, 1830.
Turner, Sam., & N. Barnes	Aurelius, N. Y.	Threshing machine	November 27, 1830.
Twitchell, Gershom	Leominster, Mass.	Truss, elastic	December 20, 1830.
Urffer, Michael	Upper Milford, Penn.	Grain, cleaning	October 1, 1830.
Varlè, Charles	Baltimore, Md.	Self-instructor	May 20, 1830.
Walker, Enoch	Woodburne, Penn.	Washing machine	May 29, 1830.
Walker, Robert	Washingtonville, Pa.	Plough	March 10, 1830.
Ware, Peter N.	Albemarle, Va.	Roofs of houses, mode of covering	November 11, 1830.
Waring, Isaac F.	Columbus township, O.	Churning, art of	April 10, 1830.
Warner, Uriel G.	Ripley, Ohio	Carding machine	October 1, 1830.
Warren, Edmund	New York	Threshing machine	January 29, 1830.
Watson, Alonson	Pendleton, N. Y.	Excavator, floating	January 18, 1830.
Webb, R., and Jonathan Cox	Madison, Conn.	Cheese press	February 27, 1830.
Wheeler, John R.	Pittsford, N. Y.	Water wheel	March 15, 1830.
White, Asa	Templeton, Mass.	Stamp, post office	February 27, 1830.

White, John	Logan county, Ky.	Steam, generating	March 29, 1830.
Whiting, Ebenezer	Berkshire, N. Y.	Saw set	October 15, 1830.
Whitney, Richard	Baltimore, Md.	Screws, wedge	April 10, 1830.
Willard, Julius	Baltimore, Md.	Shot, manufacturing	July 10, 1830.
Willard, Julius	Baltimore, Md.	Brick, bridle press	June 10, 1830.
Williams, Denison	Albany, N. Y.	Dress stock, gentlemen's, hinge and plain	October 1, 1830.
Williams, Henry B.	Baltimore, Md.	Gasometer	June 11, 1830.
Williams, Samuel W.	Elizabethtown, N. J.	Salt, manufacturing	March 29, 1830.
Williams, Thomas	Rochester, N. Y.	Hides, scraping flesh and hair from, in process of tanning	November 4, 1830.
Williams, Thomas R.	Newport, R. I.	Felt, for bottoms of vessels, &c.	May 22, 1830.
Williamson, Peregrine	Baltimore, Md.	Bedstead, cot	November 11, 1830.
Willson, Clark	Swanzey, N. H.	Water wheel	October 1, 1830.
Wilson, Increase	New London, Conn.	Grist mill	February 23, 1830.
Wilson, Samuel	Darlington, S. C.	Plough, shovel cutter	February 6, 1830.
Wilson, Samuel	Darlington, S. C.	Straw cutter	November 11, 1830.
Wing, Calvin	Gardiner, Me.	Carding wool, and other fibrous material	October 21, 1830.
Wing, Calvin	Gardiner, Me.	Water wheel, and in casting the same	October 22, 1830.
Wing, Calvin	Gardiner, Me.	Water wheel, reacting	October 22, 1830.
Wood, George	Vernon, Ind.	Lever power, projectile	June 9, 1830.
Wood, Richard	New York	Inking apparatus of Neil's printing-press	November 4, 1830.
Wood, William J.	Batavia, N. Y.	Threshing machine	October 1, 1830.
Woolly, Williams	New York	Bedstead, secret	May 17, 1830.
Wooster, Lewis, and John B. Holmes	Meadville, Penn.	Paper, manufacturing, from wood	August 3, 1830.
Yale, Linus	Salisbury, N. Y.	Stone, hewing, drilling, and picking	January 20, 1830.
Yeckley, John A.	Perry, N. Y.	Axletrees for wagons, &c.	June 7, 1830.
Younger, Jacob	Harrisburg, Penn.	Plough	June 9, 1830.

CLAIMS OF PATENTS ISSUED DURING 1844.

No. 3395.

What I claim as my invention therein, is the manner in which I have combined the slide contained in the box (D,) and the shafts therein, carrying the buttons on their ends, which are made to catch on the piece (E,) when acted upon by the key; said apparatus operating as a whole substantially as herein set forth.

SABIN COLTON.

No. 3396.

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the combination of the spring balance with the steelyard, substantially in the manner and for the purpose set forth.

I also claim, in combination with the above, the hand or indicator (K) and index (Q,) arranged as above specified.

GEORGE R. MOORE.

No. 3397.

The *mode of operation* is as follows: By the vibration of the spring-whip roll, caused by the action of the reed upon the cloth, the lower end of the strand is moved in the opposite direction of that of the upper, and is forced in the direction of and with the spring (Y,) until the impulse ceases, and carrying with it the *lever* (*u*) loosens the *strap* (E,) so that the yarn beam is allowed to run until stopped by the return of said strand, caused by the action of the *spring* (Y) upon it. The same result can probably be attained by variations in the sizes and positions which I have given, but which I have found, by experience, to be sufficient for that purpose.

In testimony whereof, I, the said William H. Brayton, hereto subscribe my name, in the presence of the witnesses whose names are hereto subscribed, on the 7th day of July, A. D. 1841.

WILLIAM H. BRAYTON.

No. 3398.

What I claim as my invention, and desire to secure by letters patent, is the combination of several hives, furnished with inclined floors, and two honey boxes on their tops, with the bee palace, in the manner set forth—that is to say: Said hives being movable, and having the entrance for the bees in the middle between the two inclined floors, and corresponding to an entrance in the floor of the palace; said entrance having an inclined alightment board, and slides to close the hives at pleasure.

AARON E. JAMES.

No. 3399.

What we claim by our improvement, and desire to secure by letters patent, is the method of filling and returning the moulds, as herein above described—that is to say: By means of the follower or filler, and the curved lever combined, operating and arranged substantially as above set forth. And we also claim the manner in which we have combined with the cistern and its revolving shaft, for tempering the mortar, the mould carriages constructed and operating substantially as above set forth.

JOHN BOOTH.
WM. H. STEVENSON.

No. 3400.

Having thus fully described the construction of my stove, and shown the manner in which it operates, I do hereby declare that I do disclaim the invention of the air-tight stove, it having been made in many different shapes; but I limit my claim to the invention of admitting rarefied air into the stove pipe, by means of a pipe passing through the stove, as represented in drawings, thereby carrying off the steam and smoke, and preventing the disagreeableness of the condensed matter.

JOHN CLINE

No. 3401.

To enable others skilled in the art to make and use my invention, I will proceed to describe of what materials it is composed, and the proportions of each separate material, as follows, to wit: Take thirty-two (32) parts mutton or beef tallow, either singly or mixed; thirty-two (32) parts linseed oil, boiled or unboiled, singly or mixed; twenty-four (24) parts yellow beeswax; six (6) parts neatsfoot oil, (N. B., the oil one pint to the pound;) four (4) parts lampblack; two (2) parts litharge or red lead—one hundred (100) parts. Place the materials in a pot of sufficient size, and reduce the materials to a liquid mass by the application of heat. When all is melted, keep stirring the composition until it becomes nearly cold; or, while in the liquid state, fill it into tin or earthen vessels for use, of convenient size for sale.

W. J. ROOME.

No. 3402.

What I claim as my invention, and desire to secure by letters patent, is the construction of the break by which the hemp and flax is acted upon in the upward as well as the downward stroke; thus acting on the opposite sides of the hemp—that is to say: I claim the combination of the upper and lower permanent breaks or rests, with the upper and lower blades attached to the movable sash; this being the *principle* of the invention, and which I desire to secure.

In testimony whereof, I have hereunto subscribed my name, in the presence of witnesses, this 3d day of June, 1843.

C. B. BUTLER.

No. 3403.

What I claim as new therein, and desire to secure by letters patent, is the manner of forming and combining the turning pin, the worm wheel with its grooves, and the metallic support in which they turn, so as to receive and give tension to the respective wires, as herein set forth.

JOSEPH S. IVES.

No. 3404.

Having thus fully described the nature of my machine for preparing tobacco for packing in hogsheads or in boxes, what I claim therein as new, and desire to secure by letters patent, is the combining of the guard or guide pieces GG with a pair of rollers, one of which is furnished with rectangular grooves, the respective parts being so arranged as to produce the intended effect, substantially in the manner set forth; together with such variations of the same as leave its principle of action unchanged, producing a like effect by equivalent means.

DAVID SMITH.

No. 3405.

I am aware that a patent has been granted to another person for a shingle machine, in which the shingle is shaved and tapered by means of two knives which are made to approach each other as the shingle passes through; and therefore it will be understood that I do not claim this as of my invention. But what I do claim as my invention, and desire to secure by letters patent, is the combination of the cams F F^2, that force the knives to approach each other with the cams E E^2, that draw the shingle between the knives substantially as herein described; and I also claim the described arrangement of the stocks to which the knives are attached, by making the end of the upper one slide in the hollow ends of the lower one—springs being interposed between their ends, to force the knives apart at the end of each operation; and, finally, I claim the turning rests for feeding the shingles, in combination with the chain and guide, for the purpose and in the manner described.

SIMEON WOOD.

No. 3406.

What I claim as my invention, and desire to secure by letters patent, is the manner in which I have combined and arranged the levers (BBBB) and lever (E) so as to effect the contra action and expansion of the cultivator; and, in combination with the above, the iron comb (F.)

In testimony whereof, I have hereunto set my hand, this 18th day of April, 1843.

ROBERT NELSON.

No. 3407.

What I claim as my invention, and desire to secure by letters patent, is the mode of scouring or cleaning grain, by causing it to pass from the cen-

tre of the revolving disk to its circumference by centrifugal force; said disk being armed with teeth, arranged as described, and combined with an upper stationary disk, furnished with teeth, as set forth in the specification. I claim the arrangement and combination of those disks; and also, in combination therewith, the fans and curb, or casing, as described.

MEREDITH MALLORY.

No. 3408.

Having thus fully described our improvements, we shall claim making the pattern from which the oar is formed, or against which the guide wheel (Q) acts, of two parts, *e* and *f*, in such manner that one of the same, or that from which the handle is shaped, shall be stationary, while the other, or part which shapes the blade, shall revolve—the whole being as herein above set forth.

We also claim arranging the cutter wheel T, and bearing *h i* upon separate carriages, for the purpose of arresting the action of the bearings during the operation of the cutters upon the blade part of the oar; the said carriages being connected together and disconnected from each other by means of the latch *a'*, and pins *b' c'*.

In testimony that the above is a true specification of our invention, we have hereto set our signatures, this 25th day of December, A. D. 1843.

BENNETT POTTER, Jr.
ABIATHER F. POTTER.

No. 3409.

Having thus fully described the manner in which I construct my puddling furnace, to be used either for the purpose of converting mineral or ore directly into the state of malleable or wrought iron, as above set forth, or for the puddling of pig metal, or other iron, with a like view, and also for the purpose of melting of iron or other metals, what I claim as new, and desire to secure by letters patent, is the construction and using of a reverberatory furnace that is heated by means of a fire chamber situated below its hearth or floor, and from which the flame and heated air are conducted over its top, so as to heat it as well below as above; the respective parts of said furnace being combined, arranged, and operating as represented and described.

SIMEON BROADMEADOW.

PHILADELPHIA, *December* 21, 1843.

No. 3410.

I do not claim, strictly, the combination with a pyramidal frustrum, or block A, of another piece of metal, forced down upon or over it, by a screw or other contrivance, *separate from the main straining screw*, and for the purpose of confining the corners or edges of the leather between the said pieces of metal; nor do I claim the forcing of the two jaws or pieces of metal together, by a screw or other contrivance, separate from the main straining screw; but that which I *do* claim, consists in the manner above described, of arranging the block A, and clasp C, so that the turning up of the straining screw shall at the same time perform the double operation of

confining the ends of the leather between the block and clasp, and of stretching the leather over the boot-form; the whole being substantially as above specified.

In testimony that the above is a correct specification of my invention, I have hereto set my signature, this 27th day of December, A. D. 1843.

JOSIAH COPELAND.

No. 3411.

What I claim as my invention, and desire to secure by letters patent, is the combination of the vertical rack, which operates the slide with the pitman and weighted lever, operated in the manner, substantially, as herein set forth. I likewise claim the combination of the vertical rack, segment rack, and ratchet wheel, operated substantially as set forth by the inclined plane S.

TMOMAS C. THEAKER.

No. 3412.

What I claim as my invention, and desire to secure by letters patent, is, making the guide blocks in hinged sections, so as to set the log by several operations of the lever, acting on the ratchet wheel, instead of one operation, in combination with the timbers T and U, and the spring V—the guide blocks being regulated by wedges, or other analogous device; all as herein described.

JOHN MILLER.

No. 3413.

Having thus fully described the manner in which I construct my planting machine, and combined the same with a common plough, what I claim as new, and desire to secure by letters patent, is the manner in which I have arranged the respective parts of said planting machine, so as to connect it with the common plough by means of a joint pin—allowing it to be attached to such plough between the handles, and to be detached at pleasure, substantially in the manner and for the purpose herein set forth.

THOMAS H. HASKINGS.

No. 3414.

Having stated the nature of my invention, and the manner of making and using the same, I would have it understood that I do not claim propelling vessels by means of reciprocating paddles; but what I do claim as my invention, and desire to secure by letters patent, is the method herein described, of causing the paddles, at the end of the return stroke, to assume a position inclined to the plane of their motion; so that, on starting, their resistance of the water shall close them, by the combination of the paddles or shutters, (9 9 9,) with the obstacles or inclined surfaces, (*p p p*,) for the purpose and in the manner described, whether the paddles or shutters be attached to vertical or horizontal axles. I also claim the shifting of the bars, against which the shutters or paddles fold; so that the paddles can be made to act in backing the vessel when desired, as herein described.

GABRIEL H. MOREAU.

No. 3415.

I claim making the generator of a series of small horizontal tubes, all on the same plane, in combination with, and opening into, a tube of greater diameter, placed at right angles with them, or nearly so—the opening or connexion between each tube in the series and the larger tube being equal, or nearly so, to the diameter of the tubes in the series, so that the communication between the tubes of the series shall be common for the water and steam.

I also claim regulating the feeding of the water into the boiler, by a floating valve in the feed pipe; the specific gravity of which shall cause it to close the aperture in the feed pipe when the water reaches the proper level, as herein described.

I further claim preventing the rush of water from one side of a series of tubes to the other, in a marine and other locomotive boilers, by means of a partition disk placed in the tubes, as herein described.

And, finally, I claim regulating the intensity of heat in the furnace, and thereby regulating the generation of steam, by the pressure of steam acting on a piston connected with the damper, which regulates the draught of the chimney, in combination with the means herein described for overcoming the friction of the moving parts, in reopening the damper when the pressure is reduced, substantially as herein described.

GABRIEL H. MOREAU.

No. 3416.

I make no claim to the individual parts of the plough, nor to making it entirely of metal; but all that I claim, and for which I ask letters patent, is the adjustable plough stock, in combination with the adjustable handle, as set forth.

WILLIAM K. ALLAN.

No. 3417.

To enable others skilled in the art to make and use my invention, I will proceed to describe the manner of compounding it.

I take of the cream of sulphur two ounces; of powdered nut galls, one ounce; of powdered opium, one grain; and mix them intimately—adding lard enough to give it a proper consistency for ointment, mixing it thoroughly, which is to be applied to the parts affected as often as twice every twenty-four hours, until a cure is effected. If the patient should be costive, take magnesia, or other gentle physic, sufficient to keep the bowels open; all of which I claim as my invention, and desire to secure letters patent for the same.

WILLIAM WILLSHIRE RILEY.

No. 3418.

I make no claim to the frame, hammers, or guides. What I claim is the bed on which the anvil is formed—shaped to correspond with the required ford of the anvil, in combination with the vertical face rest, or gauge, as set forth.

Likewise, the jointed clamp in combination with the side rests or anvils.

JOHN TAYLOR.

No. 3419.

What I claim as my invention, and desire to secure by letters patent, therefore, is, first employing charcoal for filtering purposes between two vertical surfaces (or nearly vertical) of wire cloth, or other porous material; the liquor to be filtered entering the charcoal through one of the vertical surfaces, and escaping from it through the other, as herein set forth. Secondly, I claim the method of constructing my apparatus by forming it of two vessels, one within the other, having animal charcoal within the space between them—said vessels being constructed and operating as herein set forth. I usually employ, in combination with this arrangement, a tube (*w*) for producing, by means of a column of liquor in it, a pressure on the surface of the liquor in the apparatus, as herein described.

JOHN WATSON.

No. 3420.

What I claim as my invention, and desire to secure by letters patent, is the combination of carbon, or pure graphite, with caoutchouc, shellac, together with acetate of lead, linseed oil, and spirits of turpentine, for the purpose herein set forth, forming a perfectly indestructible anti-corrosive pigment. It also serves the purposes of anti-attrition.

JOSEPH WEISMAN.

No. 3421.

What we claim as our invention, and desire to secure by letters patent, is constructing the blocks in the manner described, with the straps passing down through the shell, on the inside, close to the sheaves, in the manner and for the purpose described herein.

STEPHEN WATERMAN.
ISAAC D. RUSSELL.

No. 3422.

What I claim as my invention, and desire to secure by letters patent, is the series of rollers placed in oblique grooves, with the vibrating frame constructed and arranged substantially as herein described.

J. B. COFFIN.

No. 3423.

What I claim as my invention, and wish to secure by letters patent, is the combination of a horizontal extended screen with the wheat fan; said screen to be operated and constructed as above described.

D. WATKINS.

No. 3424.

What I claim as new therein, and desire to secure by letters patent, is the combination with a canal or other boat, having bows formed in the ordinary way, of two propelling wheels constructed as herein described and represented, and in the manner made known—said wheels being located at or near the bows, and in advance of the greatest sectional width of the

boat; their buckets also being so arranged that the plane of their surfaces, when vertical, and acting upon the water, shall be at right angles, or nearly so, with the general line of the vessel's bows, that they may displace or divide the water, and cause it to pass off from the bows of the boat in the direction designated, and for the purpose above fully set forth.

HENRY B. WORTHINGTON.

No. 3425.

I do not claim as my invention the employment of these rollers together, as this has been done for burring wool and for other purposes; but what I do claim as my invention, and desire to secure by letters patent, is the manner in which I have arranged the three rollers, (*b*, *c*, and *f*,) so that the cotton shall enter between the small rollers, (*b* and *c*,) and then pass between the roller (*b*) and large roller, (*f*,) by having them so arranged that the rollers *c* and *f* are pressed by the springs against the roller *b*, as herein described.

R. REYNOLDS, Jr.

No. 3426.

What I claim as my invention, and for which I ask a patent, is the manner of arranging and combining the steam chambers and the channels, or steam ways, in the top piece A, and in the upper cylinder head, being fitted to each other by their concave and convex cylindric surfaces, so as to cause the said steam ways or channels to operate by the vibration of the suspended cylinder, substantially as herein set forth. And this I claim, whether the engine be constructed so as to operate without a three-way reverse plug cock or valve; or if made or constructed to be capable of reversing its motion by means of such plug cock or cocks, as hereinbefore described and shown in the drawings hereunto annexed, or by any other similar mode of forming such reverse cock or valve for obtaining the same operation for reversing the motion by means substantially the same.

In testimony that the foregoing is a true specification of my invention or improvement, I have hereunto set my hand, this twenty-eighth day of September, in the year of our Lord one thousand eight hundred and forty-three.

EBENEZER A. LESTER.

No. 3427.

Having thus fully described the nature of my invention, what I claim herein as new, and desire to secure by letters patent, is the connecting of the two parts of the flask together by means of a spring hinge, formed and operating substantially as herein described; so that by its aid the flask may be closed, either with or without the piece of metal called a card between the two parts, as set forth.

THOMAS LORING.

No. 3428.

What I claim and desire to secure by letters patent, is the arrangement of suspension, sliding doors, &c., upon a suspension balance, by means of

rollers and jaws, or clamps, or by any other analogous device; the whole being constructed and operating substantially as herein set forth.

WILLIAM T. FORSYTH.

No. 3429.

What I claim as my invention, and desire to secure by letters patent, is the method herein set forth, of governing the connecting rods L, which operate the slides, viz: by attaching the said rods to the cranks G, connected with the arms F, in combination with the curved rim K; the same being constructed and operating substantially as above described.

ABRAM PEASE.

No. 3430.

What we claim as our invention, and desire to secure by letters patent, is the combination of the boiler with the elevated and concentric flue or smoke pipe, constructed and arranged as herein described.

JAMES YOUNG.
ELMON PARKER.

No. 3431.

I do not claim a cylinder of knives cutting against a solid surface, as that has been done before; but what I claim as my invention, and desire to secure by letters patent, is the cylinder having any number of arms around it, to which adjustable knives are affixed, constructed, and arranged, as above described, in combination with the roller against which they cut, in the manner and for the purpose herein set forth.

WILLIAM HOVEY.

No. 3432.

Having thus fully described the nature of my improvement in the cooking stove, what I claim therein as new, and desire to secure by letters patent, is the so combining of a cap and jambs, situated in the manner and employed for the purpose herein set forth, as that they shall be made to open and close simultaneously, by the raising and lowering of the cap—the hinge joints and levers by which the same is effected being constructed and arranged substantially in the manner herein set forth; not intending, however, by this claim, to limit myself to the precise formation of the operating parts as herein represented, but to vary the same as I may think proper, whilst I attain the same end by equivalent means.

JORDAN L. MOTT.

No. 3433.

What I claim as my invention, and which I desire to secure by letters patent, is combining a driving flue-back of the oven, and the diverging plates connected therewith, placed under the oven with the stove, as described; the whole constructed and operating as set forth.

SIMON PETTIS.

No. 3434.

Having thus fully described my improvement, I wish it to be understood that I do not claim stationary knives in the bed stone, as that has been done before; but what I do claim as my invention, and desire to secure by letters patent, is the movable adjustable knives (*b*) placed tangentially in combination with the revolving knife (*d*,) situated under the balance rim, and attached to the spindle; all constructed and arranged substantially in the manner and for the purpose herein described.

G. T. WALTERS.

No. 3435.

What we claim as our invention, and desire to secure by letters patent, is the method of forming the drag, or bottom part of the mould, directly from the pattern for casting, as before described, or by any other mode substantially the same—that is to say, by the use of the movable plate for lifting the mould from the stationary bed or pattern; thus dispensing with separate cores or chills.

BENJAMIN T. HARLEY.
JOHN D. MORRIS.

No. 3436.

Having thus fully described the manner in which we construct our improved knitting loom, and shown the operation of its respective parts, what we claim therein as new, and desire to secure by letters patent. is the manner in which we have arranged and combined the regulator, or bar N, with the stitchers M, M, so that the bar will, by its vibration, move said stitchers back and forth by its action between the shoulders thereof, as described; the horizontal position of the stitchers, and the manner of combining the bar N with them, rendering it unnecessary to use springs, or any analogous device for retracting the stitchers.

RICHARD WALKER.
JEFFERSON McINTIRE.

No. 3437.

What I claim as my invention, and desire to secure by letters patent, is an improvement on the well-known conical balance valve, in connecting the valve with the balance piston by means of a hollow stem, as herein described.

THOMAS McDONOUGH.

No. 3438.

Having thus fully described the nature of my improvement in the manner of combining and arranging the toothed rollers used in the machine for breaking coal, what I claim therein as new, and desire to secure by letters patent, is the so forming and gearing of such rollers as that the teeth of one of them shall always be opposite to a space between the teeth in the other, whenever they are operating upon the article to be broken; the same being effected substantially in the manner herein set forth.

JOSEPH BATTIN.

No. 3439.

What we claim as our invention, and desire to secure by letters patent, is the large wheel B and the wheel H, in connexion with a common clock-work or any time-keeping apparatus, combined with the gate (M,) for the purpose above described; the whole being constructed and operating substantially as herein above set forth.

SAMUEL COPE.
J. D. COPE.

No. 3440.

What I claim as my invention, and desire to secure by letters patent, is the combination of the eccentric cylindrical roller with the buckle case, consisting of back, top, and side plates; the whole being constructed and operating in the manner above described, or any other substantially the same.

JULIUS W. HATCH.

No. 3441.

What I claim as my invention, and desire to secure by letters patent, is the arrangement and combination of the flues and dampers, constructed in the manner and for the purpose set forth, so that both ovens shall be entirely surrounded with heat, if desired, without return flues.

S. S. JONES.

No. 3442.

What I claim as my invention, and desire to secure by letters patent, is the combination of the share which serves to unearth the potatoes, with an endless revolving belt or chain, serving to secure and separate them from the soil.

A. C. KETCHUM.

No. 3443.

What we claim as our invention, and which we desire to secure by letters patent, is the before-described composition for glazing earthen ware.

THOMAS PARKER.
EPHRAIM PARKER.

No. 3444.

What I claim as my invention, and desire to secure by letters patent, is the combination of the guard H, with the curved knife and arm, constructed and operating for the purpose above described and set forth.

H. M. SMITH.

No. 3445.

Having thus described the nature of my invention, and explained the

manner in which the same operates, what I claim therein as new, and desire to secure by letters patent, is the so arranging of the bar C, the spring E, the pin F, and the check piece G, as that the jaws shall be opened when one of the cars deviates from the track; the respective parts being connected with each other, and operating substantially in the manner herein set forth.

WILLIAM D. CHESNUT.

No. 3446.

What I claim as my invention, and desire to secure by letters patent, is the combination of the loaded car and rails, or to rack with the lever F, causing it to operate as such for the purpose of pressing; the whole to be constructed and operated as above described.

ROBERT SANDERSON.

No. 3447.

What I claim as my invention, and which I desire to secure by letters patent, is the arrangement of the dampers F, for concentrating the heat to the bottoms of the cooking utensils, in the manner and for the purpose described.

ASHLEY HOTCHKINS.

No. 3448.

Our improved nautical propelling machinery having been thus explained, we shall claim the combination of the flaps or paddles (hinged to the wheel, as described) with the arms E, E, &c., attached to the inner sides of the flaps or paddles, and the inclined plane or cam of sufficient length to keep the flaps open during that portion of their circuit in which they act on the water to propel the vessel; the whole being constructed and arranged substantially as hereinbefore set forth.

We also claim the above-described manner of arranging two sets of propellers upon a vessel, or with respect to the keel thereof, viz: Placing the one in advance of the other, and in a line or range with the keel, or in the direction of the keel, instead of the usual method of placing one on each side of the keel, and directly opposite to each other; the aforesaid arrangement effecting various important advantages in sailing and operating a vessel.

We also claim arranging the frame or plate H of the inclined plane G, so that it may be movable, or be made to turn on its axis horizontally; or, in other words, we claim changing the horizontal position of the inclined plane or cam, the same being for the purpose of throwing different paddles of the series into action, and thereby imparting to the vessel or steam ship a lateral quartering, or other desirable movement, as set forth.

In testimony that the above is a true specification of our invention, we have hereto set our signatures, this 3d day of January, 1844.

PETER LEAR.
EPHRAIM BUCK.

No. 3449.

What I claim as my invention, and which I desire to secure by letters patent, is combining the section C of the water wheel having cimareversa buckets E and contracted issues, with the section D having concave or cavetto-shaped buckets F; the two sections being geared together by level gearing, and turning in contrary directions in a cylindrical flume by the reaction and percussion of the water confined in said flume, as herein set forth.

EMERSON G. CABEL.

No. 3450.

What I claim as my invention, and desire to secure by letters patent, is the application to railroad cars of concave bars attached to the bottom of each car, for the purpose of preventing accidents from "snake heads" and broken wheels, &c.

ELISHA TOLLES.

No. 3451.

Having thus fully set forth our invention, we shall claim the manner of regulating the drawing of the strand from the bobbins, viz: by means of the series of gear wheels (*w*, 7, 7, 7,) hollow shaft (20,) grooved wheels (9, 9, 9,) and guides (*y*, *y*, *y*,) intervening between the larger and bobbins, the same being substantially as hereinbefore set forth. Also, the mechanism for guiding or distributing the rope upon the coiling reel, the same consisting of the reciprocating crane (*c*) applied to or used in connexion with the reel (*f*,) and constructed and operating substantially as herein above described.

STEPHEN BAZIN.
JAMES A. BAZIN.

No. 3452.

Having thus described my improvement, I shall now proceed to specify such parts and combinations as I consider or believe to be new, and claim as my invention.

I claim the combination of a projecting stud on one end of each of the "gill bars," with a stationary inclined plane, or other suitable bearing stop, attached to the inside of the frame work; which combination causes the "gill bars" to turn so much in the bearings in the chain belts as to make the heckling pins leave the silver vertically, and without breaking the fibres of the hemp; the whole being as herein above set forth.

In testimony that the foregoing is a true description of my said invention and improvements, I have hereto set my signature, this seventeenth day of October, in the year eighteen hundred and forty-three.

WILLIAM MONTGOMERY.

No. 3453.

I do claim as my invention the above-described composition of matter, which I call "Grandjean's American brick," to be made in the manner as

herein described, with the substance, and in the parts or proportions by weight, as hereinbefore particularly set forth. But I do not mean to confine myself to the very exact amount or parts, by weight, as herein stated; for a small difference in the amount of one or another part may not effect any material difference in the result produced. But I have ascertained, by experiment, that the hereinbefore-mentioned parts of the substances specified will, when properly compounded, make a composition which will, when applied with proper care, and as I have set forth above, change the color of the hair to darker shades of color, and produce various beautiful shades without burning (as it is commonly called) or injuring the texture or fibre of hair; and herein consists, mainly, the advantage of my improved composition, viz: the capacity to produce various darker shades of color in hair, applied in the manner and state as I have above described, without injuring the texture or fibre of hair; together, also, within the condition or density of the substance—it being, when prepared for use, in a solid state, of about the density of burned brick, and, consequently, convenient for use and transportation.

It is not intended to be stated that the above-specified substances can be used or compounded only in the specified or particular parts, and not in other parts or proportions differing in quantity from those I have specified; for, no doubt, a difference in proportion of said substances may produce very nearly the same effects. And I desire to claim as my invention the union or compounding of the above-mentioned substances, in varying proportions, such as experience shall dictate to be the better, and will produce similar effects to those hereinbefore stated, viz: to change the color of hair.

AUGUSTE GRANDJEAN.

No. 3454.

Having thus explained my invention, I shall claim my improvement in the chamber B B, which is applied to the reservoir A, of an oil vessel, or other article of like character in order to prevent the oil or fluid which descends on the outside of the discharging tube from running down upon the exterior surface of the oil vessel; the same consisting in covering the top, or contracting the sides of the said chamber when it opens around the discharging tube D, (as at F F, fig. 2,) and thereby making the upper part of the said chamber, so that when the oil vessel is turned over into a horizontal position, or thereabouts, the oil in the chamber will be retained by the sides and top, or converting sides alone. And I also claim a conical or other proper-shaped tube, (G,) in combination with such a chamber and opening around the discharging tube of the oil reservoir, in the manner and for the purpose as hereinbefore set forth; the said chamber having one or more holes or orifices, (H H,) connecting it with the reservoir, (A;) and the whole of the above being constructed and operating substantially as hereinbefore specified.

In testimony that the foregoing is a true description of my said invention and improvement, I have hereto set my signature, this 26th day of December, in the year 1843.

JOSEPH BENTON.

No. 3455.

What I claim as my invention, and desire to secure by letters patent, is the runner, having an upper disk, which is furrowed on its upper face as above described.

I also claim the double spout fan, in combination with the above machine, as herein described.

J. W. BROWER.

No. 3456.

What I claim as my invention, and desire to secure by letters patent, is a furrow or trench cutter, in combination with a curved channel or groove, of one or more divisions, for laying one or more pipes at the same time, as herein described; and these I claim in combination with the drum, as above described, for the purpose of depositing pipe at any described depth—the whole being constructed and operating substantially as herein set forth.

E. CORNELL.

No. 3457.

I am aware that the tracks of railroad cars have been so arranged that the axles of the wheels could be thrown in the direction of the radii of a curve by the draught or guide bar, the wheels on opposite sides being either attached to the same or on separate axles; therefore, I do not claim as my invention this general principle. But what I do claim as my invention, and desire to secure by letters patent, is the method of effecting this object by connecting the two sides, (*a a*,) in which the wheels work, by means of the cross pieces (*c c*) jointed to them, and to the draught or guide bar, as herein described.

JOHN H. QUAIL.

No. 3458.

What I claim as my invention, and desire to secure by letters patent, is feeding or supplying the polishing powder, at or near the centre of the polishing surfaces, as herein described. I further claim covering the faces of the polishing wheels with buff leather, felt cloth, or other similar material, the edges of which strips shall extend loosely over each other, half their width, more or less, as herein described.

WILLIAM VINE.

No. 3459.

What I claim as my invention, and which I desire to secure by letters patent, is the before mentioned or described manner of constructing the propellers, by extending their inclined planes, or propelling surfaces, of the paddles into the hub, or centre portion of the propeller, as set forth.

RICHARD F. LOPER.

No. 3460.

What I claim as my invention, and which I desire to secure by letters

patent, is combining with a rocking churn floats or paddles, arranged in and hinged to a frame, in the manner described; all constructed as herein set forth.

GEORGE W. COOK.

No. 3461.

Having, for the purpose of putting the public in possession of my invention, fully described the nature of my new manufacture of corrugated goods, and having also set forth the manner in which I have manufactured the same, what I claim as new therein, and desire to secure by letters patent, is the forming of such goods by the stretching of strips or threads of India rubber to such extent as may be desired; and the covering the said strips or threads, on opposite sides, with laminæ of cloth, leather, or any other suitable material; which laminæ are to be united to each other, and to the threads or strips, by means of India-rubber cement—the same being effected so as to produce a manufactured article substantially such as is herein set forth and made known.

CHARLES GOODYEAR.

No. 3462.

What I do claim as new in the above-described machine, and wish to secure by letters patent, is the combining with the calender rollers an elastic endless apron, such as is represented at *c*, *c*, and a stretching frame with its appurtenances, such as is represented at I, I, for the purpose of giving and preserving to the strips or threads their proper tension, and allowing them to pass between the laminæ of coated cloth, or other material, so as to produce the corrugated or shurred goods, by an operation of the respective parts, substantially as herein set forth.

CHARLES GOODYEAR.

No. 3463.

Having thus fully described the nature of my invention, and shown the manner in which the same is to be carried into operation, what I claim as new therein, and desire to secure by letters patent, is the combining of a lining of leather, or of hide, with a metallic box intended to be inserted in the hub or nave of a carriage wheel; such lining being secured in place, and combined with the metal, substantially in the manner herein set forth and made known.

MOSES PALMER.

No. 3464.

First—I claim the mode described and shown of governing the motives of the vertical bar E, and follower D, by the applying or withdrawing the action of the levers *v* and *u*, on the foot flanches *k* and *p* of the cylinder *l* and *g*, and the combination with these parts of the springs *s* and *t* and slotted links 5 and 6, and 9 and 10, to operate by the pins 7 and 8, and 11 and 12, on the two pairs of pawls, so as that the bar E and follower D are sustained, raised, or lowered, substantially in the manner and with the effect described.

Second—I claim the mode described of adjusting and turning the motions of the machine by the rod *r*, and nuts 13 and 14, operating on the cylinder *q*, substantially as described and shown.

In witness whereof, I have hereunto set my hand, in the city of New York, this twenty-seventh day of November, one thousand eight hundred and forty-three, in the presence of the witnesses subscribing hereto.

SMITH CRAM.

No. 3465.

Having thus fully described my invention, I do not claim as new inserting a wheel for the purpose of relieving the heel of the land side and mould board of friction, as that has been done. But what I do claim as my invention, and desire to secure by letters patent, is the combination of the roller with the plough, in the manner described, by means of the jointed bar (B) and rod, (*k*,) so as to render it adjustable.

ISRAEL LONG.

No. 3466.

I make no claim to the combined levers and follower, nor to the apparatus for drawing them together in pressing. But what I do claim as my invention, and which I desire to secure by letters patent, is the combination of the springs and levers for drawing down the follower, in the manner set forth.

GEORGE PECK.

No. 3467.

Thus I have described and set forth a variety of modes of using my improvement, which are accompanied by drawings and eleven models of the same, all of which work beautifully, and could describe still more, but it is unnecessary, as what I claim, and desire to secure by letters patent, is a *thumb piece, press, or slide*, to manage the wick by pressing the *thumb piece, press, or slide*, against the wick, or wick raiser, with the finger or thumb; or relieving the pressure from the wick, or wick raiser, combined with the roller or any other wick raiser analogous to the roller, and also the *recess or opening* in the tube or stopper, combined with either the spring thumb piece, press, or slide, as above set forth, or in any other way that is essentially the same.

Witness my hand this twenty-fifth day of January, eighteen hundred and forty-four, A. D.

SAMUEL RUST.

No. 3468.

What I claim as my invention, and desire to secure by letters patent, is the method herein described of constituting the permanent or bed grinder, by covering only a portion of the surface with teeth, and feeding in the grain at the commencement of this grinding surface, and discharging the meal at the other, instead of grinding over the whole surface, as herein described.

ERASTUS ARNOLD.

No. 3469.

Having thus described my improvement, I shall claim the mechanism by which the folders are elevated and depressed, the same consisting of the pulley (L,) cam lever (S,) bent rods (P, P,) chain or band (N,) and parts as before described; as combined with each other, and applied to the folders and sweeps, and operating substantially as hereinbefore set forth. Also, the mechanism by which the cloth is introduced into the machine, and the overlap of the first fold produced; the same consisting of the endless bands (*r*, *r*,) with their pulleys and shafts arranged substantially as described, and cross bar (*s*) or machinery of similar character, in combination with the depressing bar (*y*)—the whole being for the object and purpose as hereinbefore defined. Also, my peculiar method of feeding the cloth into the machine, so as to present it to the action of the folders as required by them, and with little or no strain upon them, viz: by supporting the cloth on one or more horizontal rods or shafts, (*u*, *v*,) placed above the folders, in combination with giving to the surface of the feed roller (*d′*) a motion sufficiently increased beyond that of the folders, to cause that part of the cloth which is between the supporting rod or rods and the feed roller to be loose or hang down in proper quantity, to readily yield to the irregular motion of the folders over the platform, caused by the cranks of the shaft which operates the sweeps of the said folders.

In testimony that the above is a correct specification of my aforesaid improvements, I have hereto set my signature, this 30th day of November, anno Domini 1843.

SILAS C. DURGIN.

No. 3470.

What I claim as my invention, and which I desire to secure by letters patent, is the arrangement of the flues (C, I, J, K,) in combination with the pastry oven (L,) as set forth, and sliding registers (N, O,) for carrying the draught under the oven, and around the pastry baker, as set forth.

SAMUEL BENTZ.

No. 3471.

What I claim as my invention, and desire to secure by letters patent, is the combination of the buckle case, consisting of the bottom, sides, and cross pieces, with the lever, containing an aperture at the end, and one near the centre. The whole being constructed and operating in the manner and for the purposes described, or in any other substantially the same.

ISAAC B. VERPLANK.

No. 3472.

What I claim as my invention, and which I desire to secure by letters patent, is combining a perforated swing board with a vibrating pressing board of machines for washing clothes, whether in the manner here described, or in any other mode or way which is substantially the same, and wherein analogous results are produced.

EPHRAIM LUKENS.

No. 3473.

I do not claim the invention of spiral flues; but what I do claim as my invention, and which I desire to secure by letters patent, is the use of spiral descending flues under the granules, as above set forth—said flues being governed by the valve I, all as set forth.

I also claim the arrangement of the flues (L, L^2, L^3,) in combination with the concave bottom of the granulating kettle (K,) as set forth.

I likewise claim the hollow valve (I) filled with water, to prevent burning out, arranged and operated in the manner and for the purpose set forth.

ABRAHAM HAGER.

No. 3474.

What I claim as my invention, and desire to secure by letters patent, is constructing the plough in the manner described—that is to say, constructing and arranging the projections H and I upon the mould board, so that the plough may be used either side up—a right or left plough.

I do not claim combining a number of ploughs, and attaching them to a frame.

HARVEY BROWN.

No. 3475.

But what we do claim as our invention, and desire to secure by letters patent, is the employment of a tubular core or mandrel, divided longitudinally into chambers, through which heated water, air, or steam, is to be passed, in the manner described, and for the purpose of preserving said core at a temperature somewhat below that of melted lead; by which device, the lead is effectually prevented from adhering to the mandrel.

We claim the manner of forming the packing of the ram C, by attaching to its end the piece of wrought iron P, rendered thin at its lower edge by forming the face of said piece concave, for the purpose above set forth. We claim the combination and arrangement of the parts constituting the water chamber, consisting of the tube *v*, the bed piece R, and the conical die; the supply of water thereto being given and governed substantially as described and represented.

CHARLES SELLERS.
GEO. ESCOL SELLERS.

No. 3476.

What I claim as my invention, and desire to secure by letters patent, is giving to the inclined or spiral paddles an inclination from the radius, for the purpose and in the manner described.

RALPH BULKLEY.

No. 3477.

What I claim as my invention, and desire to secure by letters patent, is the combination of the shaft *j*, *j*, which carries the pressing iron with the gate *d*, *d*, by means of the slide and universal joint, as described; and these,

thus combined, I claim in combination with the rock shaft C, which communicates motion to the shaft O of the half block, by the action given to the shaft *j j*. I also claim the segment piece *p p*, which carries the shaft O of the hat block, and which is shifted by the pinion S, in combination with the mitre wheels *y y*, *x*, and *w*, for the purpose and in the manner described.

CALEB MERRITT.

No. 3478.

What I claim as my invention, and desire to secure by letters patent, is the combination of grasping wires and strings with a handle of any convenient form, for the purpose of grasping objects which cannot be conveniently reached by the hand; the construction and operation being substantially as described in this specification.

ALEXANDER McWILLIAMS.

No. 3479.

We do not intend specifically any portion of the parts herein described, when employed, otherwise than we have herein stated; but we intend to limit our claim for what is new, and of our own invention, as follows: We claim the mode described of sustaining the runner stone H upon the still spindle *h*, by the bale *f*, through the chuck *g*, and the combination of these parts, with the forked cylinder in the lower end of the driving spindle *e*, to furnish a means of driving the spindle and runner stone from above, substantially as the same are described.

In witness whereof, we have hereunto set our hands, this 29th day of December, in the year 1843, in the presence of the witnesses subscribing hereto.

ELI B. NICKOLS.
DAVID MARSH.

No. 3480.

What I claim, and desire to secure in letters patent, is the giving of undulating or jolting motion to a chair, by means substantially as herein described, for the purpose of curative treatment of dyspeptics and other invalids, and for healthful exercise. I do not mean to confine myself to the precise form of construction of the individual parts, but vary them as I may have occasion, without departing from the general principles of action herein set forth: to wit, the giving of undulating or jolting motion to a chair, in contradistinction to a rocking or oscillating movement of the same, of which several examples of such variations are herein shown and specified.

OLIVER HALSTED.

No. 3481.

Having thus fully described my invention, I wish it to be understood that I do not claim the extension of a pattern by sliding one piece upon another, fastened together by nuts and screws; but what I do claim as my invention, and desire to secure by letters patent, is the combination of the

slides with the plate A and B, having graduated scales thereon, in the way described—the whole being constructed and arranged in the manner and for the purpose herein set forth.

THOMAS CRANAGE.

No. 3482.

What I claim as my invention is the combination of a grain rake of the above-described construction, with a curved handle; said handle being curved in the manner set forth, or any other substantially the same, in which the operation would not be changed—the whole operating as set forth.

B. F. PARTRIDGE.

No. 3483.

What I claim as my invention and which I desire to secure by letters patent, is the combination of the rests or pedestals G, pressers I, brake *b*, for pressing and holding the broom corn. I also claim the combination of the brake B, on the carriage C, for holding the broom corn, in combination with the wrappers Q, as herein set forth.

JACOB H. HINTON.

No. 3484.

What I claim as my invention, and desire to secure by letters patent, is the manner of fastening and securing the check hook and the loop for the back strap, and for nothing else.

ABEL B. BUELL.

No. 3485.

Having thus fully described the nature of my invention, and shown the manner in which I carry the same into operation, what I claim therein as new, and desire to secure by letters patent, is the mode herein described for inserting artificial teeth—that is to say, by enclosing a metallic tube within the wooden plug or cylinder commonly employed in fixing artificial teeth; the wood and metal being both inserted in the stump or root substantially in the manner described—the said metallic cylinder constituting the socket for the pivot.

J. SMITH DODGE.

No. 3486.

What I claim is, uniting two labels by a joint, for the purpose described; using therefor the double-hinge joint, or any of the known modes of effecting the same end.

OREN S. WORTH.

No. 3487.

What I claim as my invention, and which I desire to secure by letters

patent, is the combination of the revolving cylinder of brooms with the weighted roller, adjustable roller, and revolving winding board, as before described, for brushing and winding cloth, whether combined and arranged in the manner here described, or in any other manner substantially the same, by which analogous results are produced.

REUBEN C. VARNEL.

No. 3488.

What I claim as my invention and improvement, and wish to secure by letters patent, is the method of regulating the burning of alcohol or other inflammable liquids by means of the application of apertures and valves as above set forth and described, when applied to vapor bathing, or other purposes, separately; and, also, in combination with a chamber or reservoir (*c*, *c*) for holding the inflammable liquid that is to be conducted and burned at the aperture A, and gradually supplying the same therewith during the process of combustion, constructed and operating as above described, so as to prevent ignition. Dated at Middletown, State of Connecticut, this 27th day of February, A. D. 1844.

L. E. HICKS.

No. 3489.

What I claim as my invention, and desire to secure by letters patent, is the combination of the pawls and racks with the foot block of a press constructed and arranged in the manner and for the purpose herein set forth.

I also claim, in combination with the movable foot block, the segment (x) and the lever (y) by which it is connected with the main levers (g) in the manner described.

I lastly claim the employment of the falling bed (z) on which the bale rests, constructed and arranged as before specified, so that it shall remain in its position till the bale is pressed, when it falls out of the way till the bale is tied, and the levers connected with the head block start back.

SETH LAMB.

No. 3490.

What the subscriber claims as his invention, and desires to secure by letters patent, is in placing in the fluke of said harpoon a vial of explosive mixture, of whatever materials or ingredients it may be composed, for the purpose and in the manner heretofore described.

ALBERT MOOR.

No. 3491.

Having thus fully described the nature of my improvement in the ordinary portable furnace, what I claim therein as new, and desire to secure by letters patent, is the forming of a flue space around its upper edge, in the manner shown at D D; said flue space being formed by a projection from the body of the furnace in conjunction with the rim B, or in any other manner that is substantially the same; and this I claim, whether the rim B be made to rotate in the manner described, or whether it be permanently fixed with the opening C towards the front of the furnace.

GEORGE. E. WARING.

No. 3492.

What I claim as my invention, and desire to secure by letters patent, is the combination of the case (c) and stove (a) in the manner described; the pipe of the stove passing up through the centre of the case, and having a hole therein for the purpose set forth. I also claim carrying the two pipes (b and f) out above the roof together, and covering them both with a cap, constructed, combined, and arranged, in the manner and for the purpose herein described. Lastly, I claim, in combination with the above, the valve box (h) and valves (v) near the top of the house, for closing the outer pipes.

JOHN WOOLLEY.

No. 3493.

What I claim as my invention, and which I desire to secure by letters patent, is the before-described mode of suspending and opening and closing gates for locks, and other places, by means of the aforesaid combination and arrangement of the inclined post E, rod G, swivel H, stirrup I, and hog chains K, and the triangular-hinged lever L, segment way N, cord O, pulleys R, and windlass S; by which the expense of construction is reduced, and the old railway and rollers at the bottom of the lock, and the chains for opening and closing the gates placed in the water, (where they are subject to constant oxidation and breaking, and where they cannot be reached without much difficulty when out of order,) are entirely dispensed with.

HENRY McCARTY.

No. 3494.

What I claim as my invention, and desire to secure by letters patent, is the combination of two or more circular saws, every preceding one of less diameter than the next following one—their respective axes being on a common level; or two sets or series of saws of that description, one above the other, for the purpose of sawing together in the same scarf, timber, lumber, &c., in an easier and better manner than heretofore done; the whole being constructed and operating as herein above-set forth. *I do not claim* the application of two saws only, one above the other, for the purpose of sawing together in the same scarf.

JOHN K. MAYO.

No. 3495.

What I claim as my invention, and desire to secure by letters patent, as an improvement in the above-described machine, is the combination and arrangement of the head block Y with the shaft Q, cams V, V, V, carriage a, and cross-head M, rack G, and pinion H, arranged in the manner (or that which is substantially the same) and for the purpose set forth and described in the above specification.

WILLIAM WOOD.

New York, *February* 29, 1844.

No. 3496.

What we claim as new, and desire to secure by letters patent, is the par-

ticular manner in which we have combined the reflectors E and F with the device of a night-door plate as described; the distinctness of the lettering of the same being heightened by the illuminated light reflected by the mirrors by day or night.

JOHN H. GROUT.
FOWLER M. RAY.

No. 3497.

Having thus fully described the nature of our improvement in the construction of the machine for threshing and cleaning grain, and shown the operation thereof, what we claim therein as new, and desire to secure by letters patent, is the manner in which we have combined the vibrating screen I, I, with said machine, by placing it between the concave of the threshing apparatus, and the endless belt of revolving slats, and below the conveying cylinder, so as to operate in the manner and for the purpose herein fully set forth. We do not claim any other part of the within-described apparatus as of our invention.

LUTHER WHITMAN.

No. 3498.

Having thus fully described the nature of my improvements in the truss, for the cure or relief of inguinal hernia, and shown the manner in which I construct the same, what I claim therein as new, and desire to secure by letters patent, is the manner, herein set forth, of connecting the pad or pads to the principal spring by means of a double-jointed link contained within a cavity on the back part of the pad, arranged and operating as herein described and represented.

I also claim, in combination therewith, the manner of adjusting the pressure of the pad by the aid of the regulating bridge piece, by means of which the link may be made to bear on either side of the centre of the pad or pads, as may be requisite.

DAVID SABINS.

No. 3499.

I do not claim, in the above-described machine, making an outward blast by internal fans, as that has been done, but in a cylinder differing from mine. What I claim as my invention, and desire to secure by letters patent, is constructing the cylinder in the manner described, with vanes on the inside, creating a blast outward, through appertures made therein, as above described, and shielding said apertures by inclined beaters, as before specified, and reversing the same on the shaft.

I also claim the combination of the vertical spout (*d*, *d'*, *g*,) with the fan (*e*,) in the manner and for the purpose herein set forth, and constructed substantially as described.

JAMES M. CLARK.

No. 3500.

I claim forming an *oil cup* about the wick tubes, and above the top of the

plate of the same, by extending the perimeter or exterior rim (*f*, *f*,) of the "cap" upwards, as hereinbefore specified, and for the purpose herein above set forth; thereby superseding the use of a screw in such place as will allow the oil to get to the outside of the lamp.

In testimony that the foregoing is a true description of my said invention and improvement, I have hereto set my signature, this nineteenth day of February, in the year eighteen hundred and forty-four.

FRANCIS DRAPER.

No. 3501.

Having thus fully described the nature of my improvements, and the manner in which they are carried into operation, what I claim as new therein, and desire to secure by letters patent, is the manner herein described of altering the capacity of the fire chamber of my improved range, by forming notches in the upper ends of the checks, and a recess under the fire back.

I do not claim the altering the capacity of such fire chamber abstractedly, but limit my claim to the manner of doing this as herein represented and made known.

A. W. THOMPSON.

No. 3502.

I do not claim the gradually enlarged buckets, as used in Nelson Johnson's water wheels, and others in use; but what I do claim as my invention, and which I desire to secure by letters patent, is the peculiar manner in which I form the issues of my buckets—that is to say, by making the inner curves of the buckets, or those nearest the centre, segments of a circle, which is concentric with the circumference of the wheel and a lesser diameter; and the outer curves of the buckets, or those that are farthest from the centre, segments of circles of the same diameters described from the points X, on the dotted circle of figure 1 of the annexed drawings; the inner and outer sides of the buckets being spherical triangles, and nearly vertical when the wheel turns in a horizontal position.

HIRAM FERGUSON.

No. 3503.

Having thus fully described the manner in which I combine one or more pairs of toggle joint presses with each other, I do hereby declare that I do not claim to have made any improvement in the single press; nor do I claim either of the parts or devices herein described, when taken alone; but what I do claim as of my invention, and desire to secure by letters patent, is the combination of one or more pairs of such presses, so as to give to the followers or platens of each pair an alternating or reciprocating motion, by an arrangement of the operating parts—such as is represented in figure 2—that is to say, by the combined operation of the segment (F) on the beam (E, E,) and on the double toggle joints formed by one arm of the beam (E,) the shakle or lever (D,) and the progressive levers or toggle joints *c, c;* the whole being combined and operating substantially in the manner or on the principle herein set forth. I do not claim the mere

employment of double toggle joints to work two platens or followers, this having been before done, but in a manner essentially different from, and not producing a like effect with, that above described.

P. G. GARDINER.

No. 3504.

We do not intend to claim the use of glass for musical purposes, nor do we intend to claim the mode of fitting the action parts, shown in the drawings; but we do claim as new, and of our own invention—

First. The mode of mounting and adjusting the glass notes *b*, as shown in figure 1, by the bearing or suspending bars *a*, and the small wire rods and nuts *c c*, when applied to use in piano fortes having either an under or over action, either separately or in conjunction with wire or string notes. Second. The mode of mounting or suspending the glass notes shown in figure 2, by the bearers *e*, or by the strings or wires *i*, in combination with the mode of retaining such notes in place by elastic glue, made as described, when applied to piano fortes having a downward action; such glass notes, and mode of suspending and retaining, to be either used separately or in conjunction with wire or string notes.

In witness whereof, we have hereunto set our hands, in the city of New York, this twentieth day of November, in the year one thousand eight hundred and forty-three, in the presence of the witnesses subscribing hereto.

OTTAVIANO GORI.
PH. ERANSTZ.

No. 3505.

What I claim as my invention, and desire to secure by letters patent, is the method of adjusting the segment bush to the spindle, and sustaining the same in the position required by means of the screw rods and nuts in combination with the stationary frame and box, constructed and arranged as above set forth, or in any other mode substantially the same, wherein analogous results are produced.

JOHN HECK.

No. 3506.

I do not claim to have made any improvement in the general construction of the refrigerator, but intend to finish and arrange the interior thereof in any of the ordinary forms; but what I do claim as new, and desire to secure by letters patent, is the new manufacture of refrigerators, as herein set forth, by the combining of a lining of slate with a box or outer case of wood, substantially in the manner and for the purpose above fully made known.

DAVID EVANS.

No. 3507.

What I claim as my invention, and desire to secure by letters patent, is constructing metallic roofs, as herein described, without boarding, by means of strips (*c*) fastened to the rafters by cleats, to which the sheets of tin forming the roof are attached.

I also claim the shield plate (*f*) under the eaves, constructed and arranged in the manner and for the purpose herein described.

JOHN WOOLLEY.

No. 3508.

I claim the combination with the partition fitted air tight between the two fire chambers, as herein above described; or the forming in said partition of a smoke pipe, or flue, communicating between the two fire chambers—the whole being arranged and operating substantially as hereinbefore specified, for the purpose set forth.

In testimony that the foregoing is a true description of my said invention and improvement, I have hereto set my signature, this twenty-first day of December, in the year eighteen hundred and forty-three.

LOAMMI BAILEY.

No. 3509.

Having thus fully described my invention, what I claim as new, and desire to secure by letters patent, is the adjustable side pieces armed with knives, in combination with the revolving shaft, constructed and arranged in the manner and for the purpose herein set forth.

WILLIAM PITTENGER.

No. 3510.

What I claim as my invention, and which I desire to secure by letters patent, is the combination of the aforesaid scalloped hollow frustrum of a cone rim D, with the spherical tapered buckets C, and scalloped plate A, in the manner and for the purpose set forth.

NELSON JOHNSON.

No. 3511.

What I claim as my invention, and desire to secure by letters patent, is the combination of two cog wheels together, the cogs of which are notched to prevent the cloth held between the two wheels from being drawn out, and these thus combined. I also claim in combination with the guides, for the purpose and in the manner described in the drawings hereto annexed.

ISAAC C. LANE.

No. 3512.

Having thus fully described my improvement, I wish it to be understood that I do not claim constructing the hook with a spring for preventing the eye from unhooking, as that has already been effected in various ways. But what I do claim as my invention, and desire to secure by letters patent, is constructing a hook in the manner described above—the sides of said hook being separate from just beyond the eyes thereof, to a point beyond the last turn of the hook (*a*) where the sides recede from each other, forming projections over which the eye can only pass by springing in the sides of the hook, arranged in the manner and for the purpose herein set forth.

ELISHA C. SAVAGE.

No. 3513.

What I claim, therefore, as my invention, is the *combination* of the *cup or piston B, with the perforated screw stem C*, constructed and arranged substantially as described in the foregoing specification, and also in combination with the *cup* or *piston*, and *screw stem* the *slide D*, as above described.

JOHN TOBIN.

No. 3514.

What I claim as my discovery, invention, and improvement, and desire to secure by letters patent, is the before-described composition of gravel, clay, water, lime, and salt, for making aqueducts, cistern pipes, tubes, and other articles.

That I have not only invented and discovered the same, but brought the same into successful operation and use.

GIDEON MYERS.

No. 3515.

Having thus fully described the nature of my invention, and shown the manner in which the same is to be carried into operation, I do hereby declare that I do not claim any of the devices or apparatus herein described and represented as of my invention, with the exception of that for sustaining the fine coal within the heater, and of agitating the same; that is to say, I claim the circular rim *d*, *d*, formed as described, and suspended within the heater, so that it can be agitated by means of the shaker bar operating on its lower edges.

Secondly: I claim the combining with the said rim *d*, *d*, any number of similar rims *c*, *c*, attached to the shaker bar, as set forth; or, instead of the rims *c*, *c*, the combining of the said rim *d*, *d*, with a grate of the ordinary form, with small bars or openings; by means of which arrangement, I am enabled to burn the finer siftings of anthracite as effectually and advantageously as the nut, egg, or other sizes of this coal.

JOHN SMART.

No. 3516.

Having thus fully described the nature of my improvements in the machine for burring or cleansing wool and other fibrous substances, what I claim therein as new, and desire to secure by letters patent, is the manner in which I have arranged and combined the cylinder A with its concave, the feeding apron and rollers, by which the wool is presented to the action of the teeth on the cylinder, and the hollow trunk through which the cleansed wool is passed and delivered by the current of air created by the revolution of the cylinder.

I claim also the combining with the above-claimed machine the auxiliary cylinders B and C, with their appendages, operating in the manner and for the purpose herein fully made known.

I do not claim the use of the toothed cylinders, or of a feeding apron, or of either the parts of the said machine when taken individually; but I limit my claim to the combination and arrangement of the said parts so as to constitute a machine constructed substantially as described.

SILAS G. MUMFORD.

No. 3517.

I do not claim mixing combustible materials with clay for making brick, but I claim mixing them in such proportions as will produce bricks possessing the above-named properties.

In testimony that the foregoing is a true specification of my said discovery, I have hereto set my signature, this twelfth day of February, in the year eighteen hundred and forty-four.

NATHANIEL J. WYETH.

No. 3518.

I claim the combination with a parabolic concave reflector, or mirror, as ordinarily constructed; or the applying or fitting to the polished or reflecting surface of the same of *a concave surface, or glass, or a concave glass lens, or meniscus,* made perfectly symmetrical with said surfaces, so as to be oppositely adapted to the same; all the exposed edges of the lens, or reflector, being hermetically or otherwise sealed, so as to be air tight—the whole being constructed substantially as herein above set forth, and for the purpose specified.

In testimony that the foregoing is a true description of my said invention and improvement, I have hereto set my signature, this tenth day of February, in the year eighteen hundred and forty-four.

ALONZO FARRAR.

No. 3519.

I do not claim dividing the fire chamber and oven, and the flues at the ends of and beneath the oven of a divided cook stove; but what I do claim as my invention in stoves thus divided, and which I desire to secure by letters patent, is the combination of the vertical division plates E^3, E^4, with the horizontal division plate L, in the manner and for the purpose set forth.

ROSWELL BUSH.

No. 3520.

What I claim as my invention, and which I desire to secure by letters patent, is combining a revolving fluted roller with an adjustable flexible brush, in the manner and for the purpose set forth.

LEWIS WOODWARD.

No. 3521.

Having thus described my improvement, I now claim as my invention, and desire to secure by letters patent, the guard for protecting and holding the fibres of cotton while on the teeth of the saws, for the purpose herein set forth, and applied substantially in the manner herein described.

ELEAZER CARVER.

No. 3522.

What I claim is the mode herein described of fitting ladies' dresses by the combined use of the triple measure and diagram both graduated in the manner described.

SAMUEL S. RICHARDSON.

No. 3523.

Having thus explained the nature of our invention, we shall claim the above-described method of constructing a truss—that is to say, the combination of the diagonal tension braces and straining blocks in each panel of the truss frame of a bridge, by means of which the camber may be regulated so as to increase or diminish it, either in whole or in sectional parts of the bridge; the whole being constructed and operating substantially as hereinbefore set forth.

In testimony that the foregoing is a true description of our said invention and improvements, we have hereto set our signature, this twenty-second day of March, in the year eighteen hundred and forty three.

THOMAS W. PRATT.
CALEB PRATT.

No. 3524.

Having thus fully described my machine, I wish it to be understood that I do not claim attaching knives to a runner, as that has already been done; neither do I claim forming the disk with teeth and ribs, which has been before effected; but what I do claim as my invention, and which I desire to secure by letters patent, is the combination of the teeth and ridges with the knives in the manner described—the whole being constructed and arranged for the purpose set forth.

SAMUEL L. HERR.

No. 3525.

What I claim as my invention, and desire to secure by letters patent, is the combination of the axles (*k*) and vibrating shoe (*i*) with the seeding machine; constructed and arranged in the manner and for the purpose herein described.

DIERCK BREWER.

No. 3526.

Now, what I claim as new, and as my invention, in the above-described stove, for which I ask letters patent of the United States, is the open space between the fire chamber and oven; and, in combination therewith, the ash tubes, with their grate, for discharging the ashes.

Given under my hand, this 15th day of March, A. D. 1844.

ABNER LELAND.

No. 3527.

What I claim as my invention, and desire to secure by letters patent, is the combination of the spring stay-braces (*g*) in the manner and for the purpose herein described.

GEORGE NICHOLS.

No. 3528.

Having thus explained my improvements, I shall claim the manner by which I am enabled to vary or alter the inclination of the cutting chisels, with respect to the plane or face of the stone to be dressed, viz: by sustaining or arranging the stocks or spring holders of the chisels in the movable frame Y, which shall turn on centres or bearings disposed at one end thereof, or any other suitable part of the machine. Also, the combination with the series of cutters for dressing the top surface of the square or blunt edge cutter or cutters, (p, p,) for the purpose of forming the square corner or edge of stone, as hereinbefore set forth.

In testimony that the above is a correct specification, I have hereto subscribed my name, this 13th day of November, of the year A. D. 1843.

HAMMOND WARD.

No. 3529.

What I claim as my invention in the above, for which I ask letters patent of the United States, is the mode in which I have constructed my forcing pump—that is to say, by placing the forcing chamber, constructed substantially as described, under the water line; the valves and piston, or connecting rod, being arranged and operating substantially as set forth. I also claim, in combination with the above, placing the piston or connecting rod and the discharging passage for the water in separate bores of the pump log.

In testimony whereof, I have hereunto set my hand, this 27th day of March, A. D. 1844.

T. JEFFERSON WOLFE.

No. 3530.

Having thus fully described the nature of my invention, and shown the manner in which the same is carried into operation, what I claim therein as new, and desire to secure by letters patent, is the employment of a series of buckets, which are connected by hinge joints to two or more endless chains, in the manner herein set forth; the shafts of which buckets are furnished with friction wheels or rollers that run between ways below and above them, and have stop pieces (such as are shown at b, b) that extend back so as to come into contact with a link of the chain in the immediate * * of the next succeeding bucket, in the manner and for the purpose above fully made known; which endless chains of buckets, so arranged, I intend to combine with a floating trunk, furnished with wing gates, and otherwise constructed, as herein described.

JOHN CARNEGY.

No. 3531.

What I claim as my invention, and desire to secure by letters patent, is the balance pendulum or regulator, constructed in the manner substantially as herein specified. I also claim the cam wheel H, for moving the hammer, combined with the striking parts of the clock.

FRIEDRICK KESSELMEIR.

No. 3532.

What we claim as our improvement, and desire to secure by letters patent, is the method of creating an upward current of air, by fans placed at the bottom of the inner cylinder, and admitting air at the top instead of the bottom of the cylinder, as is now used; by which we obviate a difficulty already explained. We disclaim the invention of the machine, and all parts of it, except the fans, and the method of introducing the air, in the manner and for the purpose above specified.

SAMUEL SCAMMAN.
RUFUS NELSON.

No. 3533.

Having thus fully described the manner in which I construct my range, and also the particular arrangement of its respective parts, what I claim therein as new, and desire to secure by letters patent, is the manner in which I have combined and arranged the fire chamber A, and the ovens B and C—the former being triangular in its horizontal section, and having one of its backs in contact with one side of the oven B, and the other in contact with one side of the oven C; by which arrangement I am enabled not only to heat said ovens directly, but also to give to one of them a much greater depth than can be attained in a range of the same length, if made in the usual form.

I claim, in combination with the foregoing, the particular manner in which I have arranged the flues of the respective ovens; the draught of that marked C, after passing down the descending flue G, ascending in the flue H, thereby aiding in heating the rear end of the oven B, and, finally, escaping into the flue space I; the flue of the oven B also descending through the flue G, on one side of it, and escaping into the space J, through an opening herein designated by the letter c''.

I claim the arranging of the tube, or hollow trunk, for the conveyance of a draught of air from the ash pit through the flue space under the oven B, and into that designated by the letter K, to be conveyed off by the independent flue K′.

JULIUS FINK.

No. 3534.

What we claim as our invention, and desire to secure by letters patent, is the compounding and mixing the above articles, and the same forming the article known as "Garrison's compound balsam of liverwort candy," as is hereinbefore described.

HENRY GARRISON.
GEORGE GARRISON.

No. 3535.

What I claim as my invention, and desire to secure by letters patent, is covering the stove with a case, in the manner described, so that the flanches around the boiler holes shall connect with said case for the purpose specified.

I also claim the combination and arrangement of flues herein fully described, by which a more equal distribution of heat is effected.

FRIEDRICK KESSELMEIER.

No. 3536.

What I claim as my invention, and desire to secure by letters patent, is the combination of the shaft (3) and arms (5, 5, and 6) with the spring bolts, constructed and arranged substantially in the manner and for the purpose herein set forth.

JAMES S. SHNELL.

No. 3537.

I claim and ask a patent for the said instrument as above described, and for the purposes as specified. What I claim as new and original is the above-described method of combining an exhausting syringe with a cupping apparatus, such as is represented in fig. 1, or fig. 4, or fig. 5, or any other substantially the same in principle, by means of the cup and stuffing box as above described. I also claim, in combination with the above, the manner in which I operate the lancets for the various purposes above specified; the whole being constructed and operating substantially in the manner set forth.

In testimony whereof, I, the said Robert J. Dodd, hereto subscribe my name, in the presence of the witnesses whose names are hereto subscribed, on the 23d day of January, A. D. 1844.

R. J. DODD.

No. 3538.

What I claim, and desire to secure by letters patent, is the employment of a rotating cutter wheel, attached to the forward end of the frame in the machine referred to, for cutting the earth and sod as described above, in combination with the said plough and side cutters; and the side cutters consisting of two or more parts each, as above described, and connected together for the purpose and in the manner above mentioned.

JAMES HERBERT.

No. 3539.

Having thus fully made known the nature of my improved cast and wrought iron railway bars, and set forth the object of the combination, what I claim therein as new, and desire to secure by letters patent, is the particular manner of forming the bars at their ends, which is such that the end of one bar in its whole size shall be received between the wings or brackets which form the chair, or that part by which the next contiguous bar is attached to the string piece, as herein described and represented; by which improvement on a cast iron rail that has a wrought iron rod inserted in it, I have rendered such bars, when resting on spring pieces, perfectly safe, and am enabled to substitute a cheap for a costly rail.

JAMES M. RAY.

No. 3540.

What I claim as my invention, is shelling corn with spurs or teeth on the end of a fistular cylinder, which admits the cob to pass into the fistular;

and as the small end of the cob almost invariably contains rotten corn, which is permitted to pass between the spurs or teeth on the fistular cylinder, without touching, separated from the sound corn.

I likewise claim the originality of constructing a double sheller; that is, one at each end of the fistular cylinder.

WILLIAM McALL.

No. 3541.

I claim the arrangement, hereinbefore specified, of the gauge and feed rollers of a leather-splitting machine, so that the bilge of the lower side, or the axis of the former, shall be directly over or in the same vertical plane with the edge of the knife, while the axis of the latter is a little distance out of said vertical plane, and its upper bilge is a little above the level of the edge of the knife, for the purposes recited in the foregoing specification.

In testimony that the foregoing is a true description of my said invention and improvement, I have hereto set my signature, this 29th day of January, in the year 1844.

ALPHA RICHARDSON.

No. 3542.

What I claim as my invention, and desire to secure by letters patent, is constructing the sheath (4) so as to turn outward along the edge of the mould-board, where it joins the share; all the bolts by which the mould-board and share are connected being put through said sheath, in the manner and for the purpose specified.

JOHN THOMPSON.

No. 3543.

Having thus explained our improvement, we shall claim arranging the stud H so as to slide freely up and down, (the same being fixed upon a sliding plate F, adapted to a groove G, and combined with the main bolt,) and be operated by the key as set forth, or by any other means substantially similar, the same being for the purpose hereinbefore specified.

In testimony that the above is a correct specification of our improvement, we have hereto set our signatures, this 8th day of February, in the year 1844.

MARCUS R. STEPHENSON.
OLIVER EDWARDS.

No. 3544.

What I claim as my invention, and desire to secure by letters patent, is the combination of phosphorus with sealing wax, in the manner and for the purpose above described—not confining myself to any particular size, shape, or color of the sticks. I do not claim the manufacture of sealing wax, nor the composition of igniting matter.

JOSEPH PUTMAN.

No. 3545.

What I claim as new, are the modes herein described of regulating and

indicating changes of temperature by means of a metallic ring; also, by means of a ring of zinc enclosing a broken ring of iron or steel; said ring being attached by one of its ends to the zinc ring, and free to move throughout its length; its free end operating upon an index, by means of a rack and pinion, or other similar device. I also claim the combination of the above arrangement, which I denominate a thermostal, with a register plate or valve for regulating the heat of a stove, or for similar purposes, such as the ventilation of rooms, &c., as above described. I may use, for the above purpose, other metals whose expansive properties are well known.

For the above-described invention, I desire letters patent.

SAMUEL D. TILLMAN.

No. 3546.

Having thus set forth our improvement, we shall claim the combination of appendages to the main bolt, the sliding plates, lock case, and stud R—the said appendages being a *bent lever*, or plate N—having an arm (P) extending from it in the manner before described—and the *fixed stud* M of the lock case; the usual stud R being made to extend from the plate N, and the plate N being made movable upon a fulcrum X, applied to the main bolt; and the whole being otherwise adapted to the sliding plates and other parts, and operating substantially in the manner and for the purpose as hereinbefore specified.

In testimony that the above is a correct specification, we have hereto set our signatures, this 8th day of February, A. D. 1844.

MARCUS R. STEPHENSON.
OLIVER EDWARDS.

No. 3547.

What I claim as my invention, and desire to secure by letters patent, is constructing the sails for square-rigged vessels in two separate parts—the starboard and larboard halves being entirely independent of each other.

I also claim the combination of the jack yards and rings, and out-and-in haulers, with the yards of vessels, constructed and arranged in the manner and for the purpose herein set forth. I also claim, in combination with the above, what I denominate a jack stay, for the inner back of the sail to traverse on, as herein described.

W. C. CHOATE.

No. 3548.

What I claim as my invention, and desire to secure by letters patent, is—1st. The combination of the metallic reeds with the piano, or other similar stringed instrument, for the purposes herein described; 2dly. I claim the method of combining the bellows with the piano forte, by placing the feeder and rises side by side, so as to lie compactly under the bottom of the piano forte, without disfiguring its exterior; 3dly. I claim combining the action of the piano forte with the pallets (*e*) of the reeds, by connecting them by means of the "stick downs" (*o*) and regulating wires, (*v*,) constructed and arranged substantially in the manner and for the purpose herein set forth.

OBED M. COLEMAN.

No. 3549.

Having thus fully described my improvement, I wish it understood that I do not claim the invention of the combined series of rollers; but what I do claim as my invention, and desire to secure by letters patent, is the employment of a chain, embracing the journals of rollers as above set forth, in combination with the rollers and weight, constructed and arranged substantially as described, by which the rollers are pressed towards each other.

WILLIAM NEWBROUGH.

No. 3550.

Having thus fully described the nature of my improvement, I do hereby declare that I do not claim the forming of a roller, hollow, for the purpose of passing steam or heated air through it, in order to elevate its temperature—this having been frequently done, and for various purposes; but what I do claim as new, and as constituting a real improvement in the inking apparatus of the printing press, is the combining of a hollow roller, to be heated by steam or otherwise, with the fountain or ink trough of such inking apparatus; by means of which improvement, a quality of ink may be used which could not otherwise, and a better kind of work performed than when such roller is allowed to remain at the ordinary temperature of the atmosphere.

RICHARD M. HOE.

No. 3551.

Having thus fully described the nature of my improvement in the cylinder printing press, what I claim therein as new, and desire to secure by letters patent, is the employment of adjustable bearers on the sides of the bed, in combination with the enlargement of the cylinder, in the manner and for the purpose set forth; and it is to be understood that I do not intend to limit myself to the mode of adjusting the bearers by forming them of two wedge-like bars, as herein described—as such adjustment may be effected in other ways; but I have mentioned this mode as that which I have deemed to be the most simple and the best.

RICHARD M. HOE.

No. 3552.

I do not claim the steam valve. What I claim, and desire to secure by letters patent, is the check ring, used in connexion with the steam valve, substantially as herein described.

SPRAGUE BARBER.

No. 3553.

I claim the metallic washer (*c*,) arranged upon the spindle, and having arms (*d*, *d*) or other contrivances of like character, for the purpose of causing the same to be revolved by the flyer—the whole being operated substantially in the manner and for the purpose as described.

In testimony that the foregoing is a true description of my invention and improvement, I have hereto set my signature, this 14th day of February, in the year 1844.

PHINEAS STEVENS.

No. 3554.

What I claim as my invention, and which I desire to secure by letters patent, is the arrangement of the hives K, with the double inclined bottoms, in combination with the filth drawers M, extending under both hives—said hives being separated before their entrances by the division plates I. I do not claim the double inclined bottom, nor a filth drawer under the same; but I claim the above combination.

G. R. WEST.

No. 3555.

Having thus fully described the nature of my improvement in the manner of consuming the smoke and combustible gases that escape from the furnaces of steam engines or other boilers, what I claim therein as new, and desire to secure by letters patent, is the introducing of atmospheric air, either at its ordinary temperature, or after it has been duly heated, into the ends of the flues of such boilers, when gaseous matter enters through a tube, furnished with a register or other means of regulating the quantity admitted—said tube being situated, arranged, and operating, substantially in the manner herein set forth.

P. ROBINSON.

No. 3556.

Having thus fully set forth my improvement, I wish it to be understood that I do not claim driving the dash of a churn by weight, as that has been before effected, although in a manner somewhat different from mine; but what I claim as my invention, and desire to secure by letters patent, is the employment of a revolving churn and reciprocating dash, in combination with the driving power as herein described, for making and working butter.

HARMESS BENTLEY.

No. 3557.

What I claim as new, and desire to secure by letters patent, is the particular manner in which I combine the two kinds of wedges set forth at figures 3 and 4, with the edges of two contiguous plank, forming a seam, as shown at fig. 1; by which the wedges, so formed as described, do wedge themselves water tight, and their edges, simultaneous with the filling of the seam water tight, by wedging at their sides; also between the plank, forming the sides and bottoms of ships, cellars, and analogous purposes.

WILLIAM BENNET.

No. 3558.

I do not claim the movable screen, or a movable elevator; but what I

claim as my invention, and desire to secure by letters patent, is the combination of the movable screen revolving rake above, and endless apron elevator below, in the manner substantially as herein described. I also claim the shaking frame (*v*,) in combination with the above, constructed and arranged as set forth.

CH. W. CATHCART.

No. 3559.

I do not claim the mode herein described of fastening the buckle and eye, nor do I claim the use of this mode of fastening in clasps, where freedom of motion is not desired; but what I do claim as my invention, and desire to secure by letters patent, is the combination of a suspender buckle furnished with a projecting piece, or eye, as represented in the drawing by the letter *a*, with the clasp or hook piece, as shown at *b*, *c*, and a double strap (*d*.) I limit myself to the above combination, whereby I get freedom of motion about the pivot (*c*,) and great facility for fastening and unfastening.

HENRY DUBOSQ.

No. 3560.

Having thus fully described the manner in which I secure a covering of tin plate, or other sheet metal, on the roofs of buildings, what I claim therein as new, and desire to secure by letters patent, is the attaching of such plates by passing their edges between the joinings of double cleats or strips of wood, forming ridges from the eaves to the top of the roof, and soldering said plates to strips of metal confined down by said cleats, in the manner herein set forth.

PETER NAYLOR.

No. 3561.

I claim connecting the feet of the platen rods (E, E) with the platen or follower, by means of links or other contrivances of similar character; the object of the said links being to permit the lower ends of the rods to be moved laterally from the ends of the bale, as set forth.

In testimony that the foregoing is a correct description of my improvements, I have hereto set my signature, this 7th day of September, anno Domini 1843.

CHARLES F. PAINE.

No. 3562.

Having thus described my invention, I shall claim the triangular projection or rim (*b*) applied to the periphery of the wheel, for the purpose of opening the furrow, and thereby dispensing with a furrow plough, such as is generally used in drilling machines. Also, arranging upon the side of the wheel, opposite to that on which the first series of cams is placed, and in combination therewith, a second series, the cams of which are placed at greater or less distances apart from each other than those of the first series; the same being for the purpose of increasing or diminishing the vibrations of the seed dropper, so as readily to adapt the machine to drill or sow in

hills; the whole of the above being arranged and operating substantially as above specified.

In testimony that the foregoing is a true description of my said invention and improvements, I have hereto set my signature, this 7th day of March, in the year 1844.

LOEA PRATT.

No. 3563.

What I claim as my invention, and which I desire to secure by letters patent, is the pipe constructed in either of the methods herein described, part wood and part metal, alternately, and passing through the cistern either sinuous, or in a straight line, from one end of the cistern to the other—one a conductor of heat, and the other a non-conductor; the one passing the heat to the brine, and the other retaining the heat and passing the steam to the next metallic pipe; and so on, to the length of the pipe; whereby the heat is distributed alike to all parts of the brine, and its temperature preserved to a degree suited to the manufacture of coarse or alum salt, and equalized throughout the cistern. Any material which will produce the same result may be used for the construction of the pipes; and boxes made of plank may be used, instead of wooden pipe logs, but they are more liable to leak.

In testimony that the above is a true specification of my improvements, as above described, I have hereunto set my hand, this 6th day of April, 1844.

ISAAC NOYES.

No. 3564.

Having thus described the nature of my invention, and shown the manner in which the same may be carried into operation, what I claim therein as new, and desire to secure by letters patent, is the employment substantially in the manner, and under the combination herein made known, of a friction nut and friction piece, so as to operate upon the mandril or regulating screw or shaft of a drilling, boring, or other machine, requiring a similar kind of feed; and this I claim, whether such machine be made in either of the forms represented in the accompanying drawings, or in any other where the same principle may be applied by equivalent means.

JOHN R. GROUT.

No. 3565.

What I claim as my invention, and desire to secure by letters patent, is the manner of securing the letters in plates or signs, so as to construct both of the latter out of movable types or letters.

EDMUND MORRIS.

No. 3566.

What I claim as my invention, and desire to secure by letters patent, is the within-named method of constructing metal laths, either of iron or any other suitable material. Also, the construction of ceilings, by running the

laths diagonally across the room, so as to be least affected by the expansion; all of which is fully set forth in the annexed specifications and drawings.

PALMER SUMNER.

No. 3567.

What I claim as my invention, and desire to secure by letters patent, is the combination of the movable conductors with gate in the tail race, below the wheel, constructed and arranged in the manner and for the purpose herein set forth.

ALBERT STIMPSON.

No. 3568.

What I claim as my invention, and desire to secure by letters patent, is connecting the revolting part of the grate with the other running parts of the machine, so as to cause its periphery to move in a contrary direction to the saws; and the addition of the cylindrical slow brush, placed between and in combination with the winged brush and the saws, as described. And, lastly, I claim the grates placed above the bottom of the flues, in combination with the cotton gin, for the purpose hereinbefore specified.

JOHN H. SHERARD.

No. 3569.

What I claim as my invention, and which I desire to secure by letters patent, is the manner of constructing the rubber, as set forth—that is to say: with a flexible armed band attached by screws to the cylinder, having packing inserted between the band and cylinder, for increasing the diameter of the band, in order to compensate for the wear of the teeth, as above described.

I likewise claim constructing the stationary cylinder with grooves, and the top and bottom with ears to rise and fall in said grooves, in the manner and for the purpose set forth.

ELISHA S. SNYDER.

No. 3570.

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the double cylinder, in combination with the flue spaces and damper, constructed and arranged in the manner and for the purpose herein described—its situation being over the fire chamber, and in front of the oven.

I also claim, in combination therewith, the revolving *g*, and ledge *f*, as before specified and set forth.

PETER MILLS.

No. 3571.

I do not claim making the spring holding the pad, continuous with the main spring belt. What I do claim as my invention, and for which I solicit letters patent, is the peculiar manner in which I form the aforesaid spring arm B^2, by giving the main spring B an abrupt spiral curve at a point distant from the extremity of the spring B, equal to the length of

the required spring arm B^2, and then continuing the said bent portion of the spring obliquely downward, at an angle of about 45 degrees, with a horizontal plane, or any required angle, forming a spring arm to which the pad is attached, producing the effect above set forth.

E. A. BENNETT.

No. 3572.

What I claim as my invention, and desire to secure by letters patent, is the method of sustaining the upper end of the centre shaft, and guiding the pitch of the planet wheel pinions by means of the cap as described, which is guided by rollers on the studs of the cap under the planet wheels bearing and rolling on the inner periphery of the permanent ring; by means of which a stationary centre is dispensed with, and the wheels are protected.

A. D. CHILDS.

No. 3573.

I claim the combining of two or more drums on the same shaft, so that they shall revolve together in a suitable case, or vessel containing water, in the same way with the drum of the ordinary gasometer; one or more of which drums are so arranged and combined as to draw in atmospheric air, oxygen, or air and vapor, to be mixed, in measured proportions, with carburetted hydrogen—the proportionate quantity of each being governed by the capacity of the respective drums, upon the principle or substantially in the manner herein set forth. I claim the combining with the atmospheric air previously to its mixture with the carburetted hydrogen a portion of the vapor of naphtha, spirits of turpentine, or other suitable inflammable liquid, whether this combination be effected by means of an apparatus constructed precisely as herein described, or in any other way in which the same end is attained. I do not claim the combining of atmospheric air with the vapor of hydro-carbons, when such combination is intended to be applied immediately to the purpose of illumination, without a subsequent combination thereof with carburetted hydrogen; my claim in this particular having reference solely to the production of a triple compound of air, vapor, and gas, with which to supply the burners; by which combination, also, I effect great economy in the production of artificial light. It is here to be clearly understood, that I do not claim as of my invention the case L, L, furnished with trays to contain naphtha, or other volatile liquid; for, although I have introduced some improvements therein, it is not new in its general arrangement.

I claim the manner herein described of regulating the supply of oil, or other fluid, or fused matter, from which gas is to be made—the rising of the gasometer being made to close, and its descent to open, a cock or valve, by which such supply is governed.

I claim combining with the dipping box the vent tube *c*, proceeding from the cock *a*, as set forth, for the purpose of drawing off the volatile oil, without allowing of the escape of gas.

JAMES CRUTCHETT.

No. 3574.

In the old revolving interest table there was a cylinder containing the interest, having the days and months stated at the head of each column (in-

stead of a dial and pointer) enclosed in a round pasteboard case or box, having an opening in front, with the principal pasted on one side—the cylinder being made to revolve, by turning the shaft of the lower end with the fingers; and therefore I wish it understood that I make no claim to any part of this arrangement. But what I do claim as my invention, and which I desire to secure by letters patent, is the before-described combination of the revolving cylinder A, containing the vertical columns of numbers indicating the interests, with the permanent vertical scale *c*, showing the principal, and the dial D, representing the days and months for which the interests are to be ascertained, and the pointer E, operated in the manner and for the purpose set forth above, or in any other mode substantially the same, by which analogous results are produced.

JOHN HATFIELD.

No. 3575.

I do not claim the mode of heating and cooling by steam or water jacket; but what I do claim is said water or steam jacket in combination with a mash tub and mash rake, for the purpose of heating and cooling the mash, as herein set forth.

BENJAMIN ROOP.

No. 3576.

I am fully aware that mould boards have been made with the lines straight, which are parallel to its base, but not parallel, as I believe, to the edge (*u*, *s*) of the board; and I am also aware that lines radiating from an assumed point have been applied to the forming of the face of a mould-board—such lines having been straight, or of such a curvature as may have been preferred by the maker; but such assumed radiating point has been below the base line of the mould-board, and has consequently failed in effecting the purpose intended. I do not therefore claim any thing new in the principle; but I do claim to have devised a mode of carrying out the principle upon which my mould-board is formed, so as to have constructed an instrument more perfect in its action than any hitherto made.

And I will here observe, that, whilst I have given such precise measurements and proportions as I have found, and verily believe, to be the best in practice, they may be deviated from to a slight extent, without essentially changing the construction of the improved plough.

The radiating and parallel lines, for example, may be slightly curved, instead of being straight; the particular outline may also be in some degree changed; whilst the whole structure would remain substantially as described, and my right be as really violated as though such colorable changes had not been made.

AARON SMITH.

No. 3577.

What I claim as my invention, and which I desire to secure by letters patent, is setting the end of the log, by causing the end of the slide upon which the log is dogged, as the carriage is gigged back, to come in contact with an inclined guide, which is again moved laterally toward the carriage the required distance, for another and similar set, as the carriage advances

toward the saw, by means of a latch, or other similar appendage, in contact with an inclined gauge, or adjustable bevel, attached to the slide carrying the aforesaid guide; in which position the said inclined guide and gauge are held by a pawl attached to the said slide, dropping into a rack fixed on the frame of the mill, or other suitable place; and this method of setting the log I claim, whether it be effected by the combination of parts above set forth, or any other substantially the same for producing like results.

BENJAMIN WEBB.

No. 3578.

What I claim as my invention, and desire to secure by letters patent, is the above-described mode of uniting the hub and the spokes by making the latter embrace the former, instead of being inserted, as heretofore done; by which arrangement the connexion between the hub and the rim of the wheel is stronger, and the hub is less liable to bend out of the central line.

JAMES McCOLLUM.

No. 3579.

I do not in this patent make any claim to the manner in which I attach the land-side and mould-board to each other; nor do I herein make any claim to the particular manner in which I form the face of the mould-board, although these are fully represented and described in this specification; these improvements having been made the subjects of claims in an application for a patent for improvements in ploughs of cast iron, the oath appended to which application is dated on the 20th day of February in the present year, (1844;) nor do I claim the placing of two mould-boards upon one beam; nor the causing of the rear plough to throw its furrow slice upon that of the fore plough—these having been effected by a plough for trenching. But having ascertained, by varied experiments, that not only the special form of the outline of the two boards in their relationship to each other, as well as that of the turn of their surfaces, are points of great importance, I do claim the special form given to the two boards in their outlines, as designated by the numbers on the vertical and horizontal lines in figures 8 and 15, and on the lines showing the width in figures 7 and 14; these numbers, however, being taken as relative, as the size of the whole plough may be varied.

It will be manifest that, in making this claim, I cannot intend that these measurements should be taken with mathematical exactness, but that the outlines and proportions should be substantially the same with those set forth.

I claim the particular form given to the heel of the hinder mould-board, as shown by the triangular space *a'*, S, *m*, figure 8, and the hind view of this part in figure 8, *bis;* by which form the slice deposited by the fore plough is left undisturbed, and that cut by the hind plough is raised, preparatory to its being deposited upon it.

AARON SMITH.

No. 3580.

What I claim as my invention, and desire to secure by letters patent, is the manner in which I have combined the lever E, one end of which is to

rest on the ground, with the sliding board A; and the pointed wires 1, 2, 3, &c., with each other, and with the other parts of the trap, so that the raising of the ground by the mole shall cause the wires to descend; the respective parts being arranged substantially as herein described.

THOMAS SHAILER.

No. 3581.

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the perforated hopper C, D, revolving channelled cylinder E, and inclined conducting spouts F, as above described.

R. J. GATLING.

No. 3582.

Having thus described my improvement, I shall claim the combination of a cup or receptacle *c*, figure 2, with the chamber *b b*—the object of the said cup being to catch any carbon which may drop from the inflammable portion of the wick. Also, the addition to, or combination with, the cap of the inclined lip, *d, d,* surrounding the exterior or edge of it, and extending from and above the same, substantially as seen in the drawing; the object of the said lip being to prevent any oil or carbon that may be in the cup from running over and dropping upon the outside of the lamp, whenever the lamp is turned over into a horizontal or inclined position. Also, sinking the chamber, *b b*, entirely within the collar or neck, *g g*, in combination with a lip, *d d*, raised upon the upper edge of the collar, as represented in figure 2; the object of such an arrangement being to arrest any oil which may escape through the screw of the lamp cap, or between that formed on the exterior of the chamber, *b b*, and the interior of the collar, *g g;* the whole of the above being constructed and operating substantially as before specified.

In testimony that the above is a correct specification of my improvement, I have hereto set my signature, this first day of April, in the year 1844.

ROBERT H. EDDY.

No. 3583.

What I claim as my invention, and desire to secure by letters patent, is the above-described horizontal inclined water wheel, hung to a vertical shaft by means of the perforated cylindrical block E, the rims H and I, and the arms *h*, supported by the rims T and S, which latter oscillate on two pins for that purpose, driven into the uprights of the stationary frame; said wheel performing a *circular undulating* motion, and acting upon the vertical shaft in such a manner as to give to it a horizontally rotary motion, which, by means of a pulley in the end of said shaft, communicates motion to any desired machinery.

Instead of the wheel, a circular platform for a horse, mule, or any other suitable animal, may be substituted; the construction and arrangement of the other parts remaining substantially the same as described.

JOHN ADAMS WISZT.

No. 3584.

What I claim as new, and of my own invention, and desire to secure by letters patent, is the making of life preservers, buoys, rafts, and other articles for buoyant purposes, by distending the air bag with a helical spring, or with separate hoops or rings of iron or other metal, whalebone, or any kind of wood covered with any suitable or proper flexible material; and in combination with this, the mode of making and attaching ends of any proper material, one of which is provided with a valve, by which arrangement the permanent elastic force or stiffness of metal, or other material used for distending the bag, is substituted for the uncertain elastic force of air, substantially in the manner described.

CALLISTUS AUGUSTUS DE LIANCOURT.

No. 3585.

Having thus described our invention, we shall claim causing the cutter frame with the cutter, after the impression has been given upon the dough, to move away from the inclined bed, or apron over the bed, and leave the scraps and waste dough upon the apron or bed, and to drop the crackers or biscuit upon a shelf or other suitable receptacle separate from the apron or bed—all in the manner as above set forth; the said shelf, cutters, and apron, being constructed and operating substantially as above set forth. Also, the mechanism by which the cutter frame is operated and turned from a horizontal position to an inclined one; the same consisting of the curved bar S and horizontal bar T, in combination with the mechanism which draws the cutter frame towards the inclined apron or bed; the whole being constructed and arranged as above set forth.

In testimony that the above is a correct specification, we have hereto set our signatures, this tenth day of January, A. D. 1844.

JOHN JOHNSON.
OTIS FREEMAN.

No. 3586.

What I claim as my invention, and desire to secure by letters patent, is the application of the partition and valves for the upper suds chamber, with the cocks for drawing off the suds, when retained in the upper chamber, to the washer—described and set forth in the specification.

WILLIAM SOULE.

No. 3587.

I do not claim the introduction of the smoke, heat, or other volatile products of combustion, to the sides of an oven of a cooking range through lateral flues proceeding from the boiling chambers, or space under the boilers; but that which I do claim consists in the manner of arranging the flues which proceed from the boiling chambers and fireplace, and pass in contact with the oven, so as to equally or thoroughly distribute the heat over the exterior of the oven, and permit the operations of baking and boiling to be carried on without shutting off or interrupting the communication between the fireplace and flue space beneath the oven and around its sides;

the said arrangements consisting in carrying the lateral flues, or those proceeding from the boiling chambers, directly against the front parts or valves of the *sides* of the oven, and thence horizontally over and in contact with the top thereof, and opening the same at the top of the oven into the discharge flues, as before described, in *combination* with carrying the main discharge flue of the fireplace beneath and in contact with the oven, and around and in contact with the rear parts or halves of its sides and top; the same being connected with the discharge flue leading to the chimney, and the whole being substantially as hereinbefore set forth.

In testimony that the foregoing is a correct specification of my said invention and improvement, I have hereto set my signature, this seventeenth day of April, year of our Lord 1844.

H. H. STIMPSON.

No. 3588.

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the circular trunk, as described, to conduct the air and float out foreign matter from the machine; and the fans, constructed of two or more sets of leaves or plates, arranged one above another on a common shaft; said plates being placed diagonally upon said shaft, and arranged so that the leaves of one tier shall break points with those above them, to act upon the grain in combination with a stationary inverted cone, roughened on the inner surface by slight flutes or otherwise, and to produce a current of air through the machine, as set forth.

HENRY B. JAMES.

No. 3589.

What I claim is the mode herein described of constructing the sward-cutter harrow—that is to say, by using and combining with the harrow frame a suitable number of movable harrow teeth of the above description, for the purpose specified.

DENNIS RICE.

No. 3590.

What I claim as my invention, and desire to secure by letters patent, is the combination of the common board rule with the self-calculating cylinders, and their combined application to the measurement of plane surfaces in general, but more particularly to the measurement of the superficial contents of boards, plank, and lumber.

CHARLES ROSS.

No. 3591.

I claim the apparatus added to and combined with the burner and the reservoir D, for the purpose of maintaining the oil in the wick case at a constant level with respect to the wick; the same consisting of the distributing fountain B, and tubes *a* and *b* proceeding therefrom, and opening into or communicating with each other at *c*, (or at the level, or about the level of the top of the burner,) and with the column C, or reservoir D, as before set forth; the whole being arranged and operating in connexion with the burner and fountain beneath the same, substantially as herein above specified.

In testimony that the foregoing is a true description of my said invention and improvement, I have hereto set my signature, this 8th day of April, in the year 1844.

HENRY B. FERNALD.

No. 3592.

What I claim as my invention, and desire to secure by letters patent, is constructing the runner in the manner set forth, having involute conductors on it, intersected at the periphery by heaters, and surmounted by a fan; the whole being arranged substantially in the manner and for the purpose herein described.

A. STRAUB.

No. 3593.

I claim the apparatus, or means of receiving and holding the bristles to be cut—the same consisting of a series of teeth (*a*, *a*, *a*, &c.) extending from plate A, and having their edges or sides sharpened as before described—in combination with one or more revolving or movable cutters *b*, *b*, placed directly beneath the said teeth, and arranged and caused to pass in contact, or nearly in contact with them, so as to act in connexion therewith, similar to scissors or shears, and cut or separate those parts of the bristles extending below the teeth from the remainder, or parts above them, and thereby reduce all the bristles of the brush, as set forth. And I also claim the combination with the above of the mechanism for holding and guiding the block or brush, or presenting the bristles to the cutters and teeth, in such manner as to cause them to reduce or cut the said bristles to a regular or requisite length; the said mechanism consisting of the adjustable rails or guide bars E, E, arranged over the cutters and teeth, and in combination therewith, substantially as before described.

In testimony that the above is a correct specification of my improvements, I have hereto set my signature, this 3d day of April, in the year 1844.

SAMUEL TAYLOR.

No. 3594.

What I claim as my invention, and desire to secure by letters patent, is sustaining the roller (*b*) by means of a cord (*r*) passing over pulleys, and winding up with the cloth, constructed and arranged in the manner and for the purpose herein set forth.

I also claim, in combination with the awning, the rollers *a* and *e*—one for the awning, and the other for the sustaining cords, as herein described.

JOHN SEBO.

No. 3595.

What I claim as my invention, and desire to secure by letters patent, is the prevention of heating of journals and boxes, by surrounding them with a reservoir of water, so as to prevent the access of water to the oil box and journals, as herein described; thereby preventing heat, and, consequently, the drying away of oil, and wear of the rubbing surfaces, and the necessity of frequent oiling; using for the reservoir any material suitable, and any composition or metal for the bearings.

ELISHA REID.

No. 3596.

What I claim therein as new, and desire to secure by letters patent, is the improvement herein described, of taking the steel from the oven in its heated state, and subjecting it to the action of rollers, or of the tilt hammer, without the necessity of reheating the bars; by which improvement said manufacture is greatly facilitated, and the quality of the steel much improved.

SIMEON BROADMEADOW.

No. 3597.

Having thus fully set forth the nature and operation of my improved inflammable gas or vapor engine, what I claim therein as new, and desire to secure by letters patent, is the manner in which I have combined and arranged the air pump, the reservoir, the retort, the air regulator, and the cocks which govern the admission of atmospheric air into the valve box, and other immediate appendages, as above described; by which arrangement I am enabled to supply the inflammable vapor or gas in regulated proportions, and to produce a pressure within the cylinder slightly exceeding that of the atmosphere, at the moment of opening one of the ignition orifices; which outward pressure is to be immediately succeeded by a draught inwards, this being effected in the manner and for the purpose above described. I claim, also, the manner set forth of heating the retort, employing the heated air which escapes through the eduction tubes so as to render such air effective in converting the combustible fluid employed into vapor.

STUART PERRY.

No. 3598.

What I claim as my invention, and desire to secure by letters patent, is the combination of the materials prepared as to formula No. 1, named in the foregoing specification, and other known substances of the same nature, with the various ingredients therein referred to, or other known substances of the same character, according to the different formulas therein set forth.

E. DEUTSCH.

No. 3599.

I claim the mechanism denominated the "take-up motion," or which operates by means of the filling thread—that is to say, the series of strings, *i*, *i*, *i*, as applied to the lay, in combination with the knotted cords *h*, *h*, and other parts connected thereto, and those intervening between the cords and the shaft *e'*—the whole being arranged and operating together substantially as described; and for the purpose of producing a regular, progressive rotary motion to the shaft *e'*, and also to the cloth roller, in order to wind the cloth on the latter as the weaving process is carried on.

I also claim the apparatus which interrupts the operation of the loom, or causes the same to stop whenever the filling thread breaks—that is to say, the combination with the "take-up motion" of the mechanism intervening between the hand lever F and the lever *z*; the said mechanism consisting

of the horizontal shaft u^1, having its arms x, x^3, (all of which are actuated by an eccentric on the shaft a^2,) and the horizontal lever o^1, p^1, q^1, having its tripping plate S^1, and other parts connected therewith; the whole being constructed and operating substantially in the manner as above set forth.

I also claim the peculiar mechanism by which the double shuttle box is raised and depressed, in order to adapt the loom to the weaving of striped fabrics; the said mechanism consisting of matched circular plates e^2, f^2, the pawls and dogs above the same, the sliding shaft o^2, shaft g^3, and other parts applied thereto, and connected with the shuttle box; the whole being combined, arranged together, and operating substantially as above described.

I also claim the combination with the circular plate e^2 of the notched circular plate v^3; the whole being actuated and arranged substantially as described, and for the purpose of effecting, at certain intervals of time, the weaving of a wider stripe than is woven by the combined action of the other circular plates.

In testimony that the foregoing is a true description of my said invention and improvements, I have hereto set my signature, this 31st day of March, in the year 1843.

JAMES NIELD.

No. 3600.

What I claim as my invention, and desire to secure by letters patent, is the employment of the drum (b) in combination with the knives for cutting curved shingles, and guides (c) for carrying off the shingles; the whole being constructed and arranged substantially as herein set forth.

JONATHAN P. BARTLEY.

No. 3601.

What I claim as my invention, and which I desire to secure by letters patent, is constructing the mill bush with an annular chamber c, c^2, for containing the oil, or other lubricating substance used for oiling the mill spindle, by making corresponding circular grooves in the bottom of the screw cap D, and in the top of the piston E, which thus answers the two-fold purpose of oil chamber and driver for keeping the annular rings of leather packing F contained in the cylindrical cup A lubricated, and against the spindle, in the manner and for the purpose set forth.

ROBERT M. WADE.

No. 3602.

Having thus concluded my description, I shall claim arranging the two sets of chisels (tenoning and mortising) upon one movable and reversible head B, (as represented in figure 2,) instead of disposing them on separate heads, in the usual manner. In testimony that the above is a true specification, I have hereto set my signature.

ELBRIDGE LYMAN.

No. 3603.

What I claim as my invention, and desire to secure by letters patent, is

the combination of the three above-described measures for the purpose described; and also the first and third measures above described, for the use and purpose described.

HENRY ISHAM.

No. 3604.

What I claim as my invention, and desire to secure by letters patent, is uniting the two sides of the scraper with a hinged joint at one end, and clamp brace pieces at the other, that the two sides may be separated or brought near together, for the purpose and in the manner described. I also claim the gate in combination with the scraper, for the purpose and in the manner described.

SAMUEL G. SUTTON.

No. 3605.

Having thus fully set forth the nature of my improvement in the process for obtaining malleable iron directly from the ore of that metal, what I claim as new therein, and desire to secure by letters patent, is the effecting of such reduction by mixing in due proportion the ores known as oxides and carburets of iron, (without the *necessary* admixture of fluxes or carbonaceous matter,) and exposing them to a proper temperature for fusing the same in a furnace so constructed that the flame shall not reverberate upon the mass, but shall pass over it in contact, or nearly in contact therewith.

SIMEON BROADMEADOW.

No. 3606.

What I claim as my invention, and desire to secure by letters patent, is the employment of a wheel enclosed in a case, as herein described, having tangent pipes leading forward and out at the sides of the vessel, in the manner and for the purpose herein set forth; the whole being submerged in a recess in the vessel, and acting in any direction at the will of the engineer, without reversing the motion of the wheel, or in any way checking the engine, by means of shutters or gates, arranged as above described.

PETER VON SCHMIDT.

No. 3607.

Your petitioner, the said Griffin Reynolds, jr., claims, as his original improvement upon Laramore's hemp cradle, the combination of the knife, constructed as described, with the front brace (B) and space between the first finger (O) and the knife.

In witness whereof, the said Griffin Reynolds, jr., has hereunto set his hand, the 16th day of September, 1843.

GRIFFIN REYNOLDS, Jr.

No. 3608.

I claim the method by which I am able to effect the passage of the yarn from one set of squeeze rollers to the other, throughout the series thereof,

without its receiving, during the same, more tension than is necessary to operate the "stop motion;" the same consisting in arranging and actuating each set of squeeze rollers so that the yarn shall be passed by and between its rollers at a lower rate of speed than it does through the set immediately preceding; and applying a "stop motion" to the yarn and each set of squeeze rollers, in the manner herein above set forth, so that the slackening of the said yarn between each two sets of squeeze rollers shall throw the machinery, by which one set of said rollers is revolved, out of action until the succeeding set is enabled to take up the surplus yarn.

Also, the method by which the yarn (or *coils* thereof) is protected from entanglement and friction, while passing and being wound several times around the various squeeze and dipping or other rollers and steam cylinders of the mechanism, viz: By arranging the said rollers and cylinders in the regular positions, with respect to the general course of the yarn through the machine, or with respect to the frame work of the machine, as above described and represented in the drawings; the whole of the above mechanism being constructed and operating substantially as above described.

In testimony that the foregoing is a correct specification of my said invention, I have hereto set my signature, this 12th day of April, in the year 1844.

WILLIAM A. BURKE.

No. 3609.

What I claim as my invention, and desire to secure by letters patent, is the screw (*d*) and mandrel (*f*,) constructed and combined in the manner described, in combination with, and driven and fed up to the work by means of a driving shaft (*q*) and spur wheels, and adjustable cams thereon; the said cams driving the screw by means of the lever *o*, pawls *m*, and ratchet 2; the shaft being moved in a lateral direction by the pinion on said mandrel; the whole being constructed, combined, and arranged, in the manner and for the purpose herein described. I also claim the pieces (*p*) in combination with the lever (*o*) and pawl, for holding the pawl to or from the ratchet wheel, as herein set forth.

AMOS MORGAN.

No. 3610.

What we claim as our invention, and desire to secure by letters patent, is the cover (*b*,) having a series of concentric rings projecting therefrom, with studs between them, in the manner and for the purpose set forth.

We also claim, in combination therewith, the runner constructed and arranged as herein described. We claim, also, the inclined planes (*e*,) having their lower sides punched with holes for admitting the air to the fan (*c*,) in combination with the runner, as herein specified, and in combination with the spouts (*i* and *k*) for directing the blast from the lower fan, and conducting off the grain, and separating the cheat, &c., therefrom. Lastly, we claim the step constructed as herein described.

ELISHA W. YOUNG,
THOMAS H. WILSON.

No. 3611.

I claim the ledge or rib *a* (applied and fixed to the socket or shank of the knob) in combination with one or two studs *k*, *l*, (inserted in, and projecting from the door, or from an escutcheon plate (G) affixed to the door,) and an opening slat or passage (g^1) cut or formed through the door and escutcheon plates, for the shank of the knobs to move through horizontally; the whole being constructed, arranged, and operating substantially as above described, and for the purpose of retracting the spring bolt, either by *turning or sliding the knobs*, in the manner set forth.

In testimony that the foregoing is a correct specification of my said invention, I have hereto set my signature, this 10th day of April, in the year 1844.

ALBERT BINGHAM.

No. 3612.

Having thus fully described the manner in which I construct my improved cooking stove, what I claim therein as new, and desire to secure by letters patent, is the manner of forming the space leading to the exit pipe, by means of the partition plates E, E, for the purpose set forth, in combination with the enlarged flue space (D^1) leading thereto; by which arrangement, and that of the flues, I secure an unobstructed draught into the exit pipe I, and am enabled to direct the draught around the oven, in the manner herein fully made known.

ISAAC STRAUB.

No. 3613.

Having thus fully described the manner in which I construct my cooking stove, what I claim therein as new, and desire to secure by letters patent, is the manner in which the flue spaces therein are arranged and governed, so as to convert that part which is usually employed as a flue space between the two ovens into a heated air space, by means of the permanent partition D; the whole arrangement of the flues, and their combination with the other parts, being such as is herein described and represented.

THOMAS BENT.

No. 3614.

First. I claim hides and skins by hydrostatic pressure, when formed into bags, when they are confined, or supported, or suspended into continuous smooth-sided narrow compartments or stalls, as described.

Secondly. I claim tanning by hydrostatic pressure, when a hide or skin is formed into a bag, and immersed totally or partially into liquor, and either confined in a continuous smooth-sided compartment, or allowed to expand or swell to its natural dimensions without confinement, or jammed against other hides and skins, as described.

JOHN COX.

No. 3615.

What I claim as my invention, and desire to secure by letters patent, is

the construction of the cork-sole boot in the manner described; having a rand extend from the ball of the foot, where the welt terminates, round the toe, which, together with the two in-soles, completely envelopes and securely confines the cork sole, and they together form a firm basis to peg the out-sole to; the whole being constructed and arranged in the manner and for the purpose substantially as herein set forth.

W. L. McCAULEY.

No. 3616.

I do not claim the general plan and principle of constructing churns with plungers, worked either by hand or by crank motion; but what I do claim as my invention, and desire to secure by letters patent, is the mode of constructing dairy churns, with two *rake-formed* plungers, with teeth interraking, and with oppositely reciprocating motions, communicated to them by a cranked shaft, as herein substantially described and set forth.

JASON B. SCHERMERHORN.

No. 3617.

What I claim as my invention, and which I desire to secure by letters patent, is the combination of the cylinder of oblique curved heaters H, the oblique wings K, and reticulated portion M, under an arrangement as aforesaid, for the purpose of cleaning grain, as above set forth.

JAMES W. WEBSTER.

No. 3618.

What I claim as my invention, and which I desire to secure by letters patent, is the *mode* of moving the second cutter G, causing it to recede from the centre of the hollow mandrel, to cut pieces of wood tapering, by the *combination* of the wedge H, plate I, arms L, and rock shaft M, carriage T, and gauge rod R, arranged and operated in the manner and for the purpose set forth, or in any other mode substantially the same, by which analogous results are produced.

WYLLYS AVERY.

No. 3619.

Having thus fully made known the nature and operation of my machine for manufacturing mercurial ointment, blue mass, and other unctuous mixtures or compounds, what I claim therein as new, and desire to secure by letters patent, is the manner of forming and arranging my combined knives, each of them having a flat and a double levelled side, and being attached, in the manner set forth, to a piston rod which is allowed to rotate; said combined knives operating in a cylinder, in the manner and for the purpose herein fully set forth.

JAMES W. W. GORDON.

No. 3620.

What I claim as my invention, and which I desire to secure by letters

patent, is the before-described mode of separating grain from straw, by subjecting it to the action of an inclined revolving cylinder of teeth, within a smooth case, made larger at one end than at the other, for the purpose of allowing the straw and grain to have a spiral movement downward and around the cylinder, from the feeding toward the discharging end, by which it is subjected to the action of the revolving teeth at every revolution of the cylinder, without the danger of the machine clogging, and without the use of any concave of the ordinary construction provided with teeth; said concave being constructed and arranged as before described.

FREDERICK A. STUART.

No. 3621.

What I claim as my invention, and which I desire to secure by letters patent of the United States, is the above mentioned and described machine, consisting of a metallic cylinder, metallic axle, and metallic rubber—all as above described; the cylinder to be either stationary or revolving; the axle to revolve within it; and the rubber to be spirally arranged, so as to rub against the cylinder when the machine is in motion.

The cylinder, axle, and rubber, may be made either of similar or dissimilar metals; dissimilar metals are, however, recommended as most advantageous.

WILLIAM H. SMITH.

No. 3622.

I claim the construction of the pulverizer, as set forth—the arrangement of the vent to let off the surplus clay into the box or hopper, facing the pistons with felt, gum-elastic, or leather; and the combination of the small press for discharging the brick, with the brick press; said small press being constructed and arranged as described. I also claim the mode of operating the press by means of the elbow Z, and lever *p*, operated by a connecting rod and crank, in combination with the several cams upon the wheel—said cams acting in unison with the lever and carriage; the whole being constructed and operating as set forth.

In testimony that the above is a true specification of my said improvement, as above described, I have hereunto set my hand, this 27th day of May, 1844.

MARK TWITCHELL.

No. 3623.

I do not claim the parts of the above apparatus, but what I do claim as my invention, and desire to secure by letters patent, is the arrangement of the drums and combustion of chamber, in the manner and for the purpose above specified.

GEORGE WALKER.

No. 3624.

Having thus fully described my invention, I wish it to be understood that I do not claim the diving flue, or double oven; but what I do claim as my invention, and desire to secure by letters patent, is the shield plate (*i*)

attached to the grate *f*, in the manner and for the purpose herein set forth, so that it can be removed therewith at pleasure.

JAMES WHITE.

No. 3625.

What I claim as my invention, and desire to secure by letters patent, is the combination of the wheel, constructed as aforesaid, with the circle of shutes in the case in which the wheel is placed as above set forth.

DANIEL WEAVER.

No. 3626.

Having thus fully described the manner in which I construct my cooking stove, what I claim as new, and desire to secure by letters patent, is the employment of three plates between the fire chamber and the oven—the foremost of these plates being divided into two parts, as shown at *a* and *d*; these parts being connected together and combined with the plates *b* and *c*, and with the body of the stove, as set forth.

I claim, also, the manner of supporting the drop doors of the ovens, by extending the lap or hearth back to them, as described.

CALVIN FULTON.

No. 3627.

What I claim as my invention, and desire to secure by letters patent, is the combination of the circular plate with the curved lower plate—the former being embraced by the hooks projecting from the latter; and, in combination with these, I also claim the globe head of the king bolt fitting in the concave of the cross bar, for the purpose and in the manner described.

GEORGE W. HATCH.

No. 3628.

Having thus fully described the manner in which I construct and arrange the respective parts of my stove, what I claim as new, and desire to secure by letters patent, is the manner of arranging the heated air space between the upper and lower ovens, causing a current of highly heated air to pass through it, by making perforations through the back oven plate, in the manner set forth. I do not claim the use of a heated air chamber, or either of the other devices herein named; but I limit my claim to the use of a heated air chamber, under the combination and arrangement thereof described and represented in this specification.

JOHN C. HERMANCE.

No. 3629.

I disclaim all invention to the individual parts before described; but what I do claim, and desire to secure by letters patent, is the manner herein described and set forth, in which I have arranged the movable parts of the tail block, and combined them with the carriage, so that, by the oblique inclined shoulder S of the setting slide C and the spring G, in combination

with the sloped or levelled edge of the wedge-shaped way W, (by which the slide C is raised and made fast against the slide block D,) a horizontal, lateral, and vertical compound action is produced—the pressure of the slide block D, with the log thereon, upon the permanent bearers B, *b*, being diminished, and the lateral movement of the log towards the saw effected in the manner and for the purpose set forth.

I also claim the manner of setting the end of the log resting on the head block, by the combination and arrangement of the divided slide C^2, connected by the connecting yoke P, and the shoulder on the under side of the slide C^2, and spring Y, in conjunction with the wedge-shaped block *w* and inclined planes *k*, k^2, for the purposes set forth.

JOSEPH J. PARKER.

No. 3630.

What I claim as my invention, and desire to secure by letters patent, is the method of throwing the bolt by means of the pin *p*, fig. 8, on the rotary tumbler working in a groove *j*, in the bolt *b*, fig. 9, in combination with the arrangement of pistons in the rotating tumbler and circular rim, as herein described.

LINUS YALE.

No. 3631.

I am aware that double toggle joint presses have been constructed with a windlass stationed in the centre between the said joints, and that pulleys have been used to draw together toggle joints, in which the ropes extend straight across from the centre joint of one to the centre joint of the other. Toggle joints have also been made with arms of unequal length; therefore, I do not claim either of these general principles. But what I do claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the toggle joints, as herein described, with the purchase fixed between said joints, in the manner and for the purpose set forth, so that the lower arms are allowed to fall into a horizontal position, and are raised by a purchase placed at a stationary point, and between them.

WILLIAM SEWELL, Jr.

No. 3632.

What I claim as my invention, and desire to secure by letters patent, is the flagellating or whipping the hides by means of the beaters, as herein described, or any other mode substantially the same.

ROBERT DOWNEY.

No. 3633.

Having thus fully described the nature of the process by which I prepare my improved India-rubber fabric, I do hereby declare that I do not now claim the combining of sulphur with caoutchouc, either in the proportion named, or in any other—this combination having been the subject of a patent granted to me on the 24th of February, 1839; but I do claim the combining of the said gum with sulphur and with white lead, so as to form a triple compound, either in the proportions herein named, or in any other within such limits as will produce a like result. And I

will here remark, that, although I have obtained the best results from the carbonate of lead, other salts of lead, or the oxides of that metal, may be substituted therefor, and will produce a good effect. I therefore, under this head, claim the employment of either of the oxides or salts of lead, in the place of the white lead in the above-mentioned compound. I also claim the formation of a fabric of the India rubber by interposing layers of cotton batting between those of the gum, in the manner and for the purpose above described.

I likewise claim, in combination with the foregoing, the process of exposing the India-rubber fabric to the action of a high degree of heat—such as is herein specified; by means of which, my improved compound is effectually changed in its properties, so as to protect it from decomposition or deterioration, by the action of those agents which have heretofore been found to produce that effect upon India rubber goods.

CHARLES GOODYEAR.

No. 3634.

What I claim, and desire to secure by letters patent, is the combination of the hook and levers with the hames, substantially in the manner described.

NATHAN POST.

No. 3635.

What I claim as my invention, is the method of hardening and coloring wood, by diffusing tannin, or tannic acid, together with vegetable colors, throughout the whole structure of the wood, and incorporating the same therewith by the aid of caustic, potassa, or soda, or other analogous substance, in the mode herein described; and, in varying the color afterwards, by the use of metallic salts, whose base has an affinity for tannin, or tannic acid; and also for the application of the same process to Manilla grass, and other articles used for cordage and ship rigging.

CHARLES F. SPICKER.

No. 3636.

What I claim as my invention, and desire to secure by letters patent, is the combination of the air chambers (*i*, *i*) and (*d*, *k*) surrounding the fire, with the tube grate—the chamber (*k*) having a double return flue (*f*) therein, as described.

JEPHTHA BRADLEY.

No. 3637.

What I claim as my invention, and desire to secure by letters patent, is the combination of the inclined plane C, with the levers A and E, arranged and operated in the manner and for the purpose set forth.

AMOS JACKSON.

No. 3638.

What I claim as my invention, and desire to secure by letters patent, is the employment of separate or double slides between the drawers—one for each—constructed and arranged in the manner and for the purpose herein set forth.

JAMES A. CUTTING.

No. 3639.

What I claim as my invention, and desire to secure by letters patent, is the above-described process of tanning hide into leather in a quicker manner than usual, and without the aid of steam or any chemical composition; and, in connexion therewith, the peculiar arrangement of the vats used for said purpose; all as above set forth.

ADAM KETTERING.
AUGUSTUS VOGLE.

No. 3640.

Having thus fully described the manner in which I construct my improved cooking stove and its appendages, and shown the uses thereof, what I claim therein as new, and desire to secure by letters patent, is the particular arrangement of the flues and valves, as set forth. I do not claim either or any of these, excepting under the special arrangement and combination thereof above made known, and by which they are rendered susceptible of the various changes above described.

HENRY W. CAMP.

No. 3641.

Having thus fully described the nature of my machine, and explained the manner in which the same operates, what I claim therein as new, and desire to secure by letters patent, is the manner of giving the necessary lateral play to the vibrating and the stationary swords, so as to accommodate themselves to the varying bulk of the material, by attaching the swords to the divided beams and divided standards, as described.

AARON F. BRUCE.

No. 3642.

Having thus fully described my machine, what I claim therein as my invention, and desire to secure by letters patent, is the cutter head, constructed and arranged as herein described, having chisels and picks attached thereto, enough to extend across from one side of the stone to the other, in a line, and all operating at once the whole width of the stone, in the manner and for the purpose herein described.

I also claim, in combination therewith, the side cutters, constructed and arranged as above specified.

JACOB JENKS.

No. 3643.

What I claim as my invention, and desire to secure by letters patent of the United States, is the application of my metallic springs to the piano, harp, and all other musical stringed instruments, as an improved substitute to the common hitch-pins now used, and for the purpose of giving elasticity to the strings, and for keeping them in tune for a long period of time.

LOVERING RICKETTS.

No. 3644.

What I claim as my invention, and desire to secure by letters patent, is the cutter (*d*) constructed and arranged as herein described, in combination with the sheath and beam, as above set forth.

JONATHAN MOOERS.

No. 3645.

What I claim as my invention, and desire to secure by letters patent, is the combination of the oblong perforated vibrating axle H, the oblong perforated lever G, connected thereto by a screw bolt I, the hock F, for grasping or gripping the article to be bored, with the machine for boring, in the manner and for the purpose set forth.

PETER BAYLOR.

No. 3646.

Having thus fully described my improvements, what I claim is the combination and arrangement for defending the hopper-formed entrances, by means of the glass placed around the entrance thereof, and the shield boards constructed and arranged as above specified; the form of the hive being as herein set forth.

JACOB D. FULKERSON.

No. 3647.

What I claim as my invention, and which I desire to secure by letters patent, is causing the fire, cinder, and dirt, to descend into a well in the bed of the forge, when fresh coal is to be supplied, without disturbing the fire, and accumulating the cinder and dirt on the hearth, as in the common forge; the cinder and dirt being removed from said well through an aperture or opening at the bottom thereof; and this principle I claim, whether it be effected in the manner set forth, or in any other mode in which analogous means are used.

FREDERICK A. STUART.

No. 3648.

Now, what I claim as my invention, and wish to secure by letters patent, is—1st. In the heading cutter, attaching the knife and bed each to a lever, so arranged as to cause the knife and bed to move in opposite directions; by means of which arrangement, more or less draw can be given to the cutter, as hereinbefore described. 2d. In the stave cutter, the vibratory motion given to the bed piece; by which means the labor of feeding the machine is greatly facilitated, inasmuch as the bed is inclined downward *toward* the gauge when it is ready to cut, (which makes it feed easily,) and *from* the knife after the cut, so the hat block can be more easily withdrawn, to turn it in the machine, or to take off the core. 3d. In the head machine, the fixing of saws or cutters on the face and on the periphery of a revolving wheel, to cut complete heads, at one operation, from pieces presented to it under an angle, as hereinbefore set forth and described.

ISAAC CROSSETT.

No. 3649.

What I claim as my invention, and desire to secure by letters patent, is the breech opening and closing on a rod as a centre, which runs parallel with the main barrel in the operation of loading and firing fire arms.

WILLIAM W. HUBBELL.

No. 3650.

Having thus described my invention, I shall state my claims as follows: I claim the combination with the three apartments A, B, C, of the filtering apparatus of the three pipes *g g g*, *h*, and *k k*, in the manner and for the purpose described.

In testimony that the foregoing is a true description of my said invention and improvement, I have hereto set my signature, this 19th day of March, in the year 1844.

JOHN H. THORNDIKE.

No. 3651.

Having thus set forth our improvement, we shall claim the secondary lever plate *a*, in combination with the main lever plate *b*, *b*, the same being applied thereto, and operating therewith, as hereinbefore described.

In testimony that the above is a correct specification of our improvement, we have hereto set our signatures, this 8th day of February, in the year 1844.

MARCUS R. STEPHENSON.
OLIVER EDWARDS.

No. 3652.

What I claim as my invention, and desire to secure by letters patent, is the combination of the revolving shaft, arms, and cam, with the whippletree, in the manner and for the purpose herein described; the whole being constructed and arranged as before specified.

JOHN MADDEN.

No. 3653.

I am aware that springs have been attached to the bottom of the carriage, and that these have been connected with the frame by means of levers; and therefore I cannot claim this general arrangement as of my invention. But what I do claim as my invention, and which I desire to secure by letters patent, is combining the springs which are arranged within the seat of the carriage, and the levers jointed to the body of the carriage, with the cranked shafts, one of which is permitted to rock, and both being so connected and arranged as to admit of being reversed with facility, to hang the body of the carriage high or low, as herein described.

JOHN REYNOLDS.

No. 3654.

What I claim as my invention, and which I desire to secure by letters

patent, is the combination of the rocking beater I, J, with the flexible bottom G, rollers F, and vibrating box C, arranged and operated in the manner and for the purpose set forth.

OLIVER B. WIGHT.

No. 3655.

Having thus fully described the manner in which I construct my cooking stove, and shown the operation thereof, what I claim therein as new, and desire to secure by letters patent, is the manner in which I have combined my fireplace with the other parts of the stove, by placing it on the rear side thereof, in direct contact with the back flue, in the manner and for the purpose herein set forth.

I claim, also, the connecting of the space or depression, in the sunk hearth, with the fire end of the fire chamber, by means of the cavity F, as described, and substantially in the manner and for the purposes above made known.

JAMES WAGER.

No. 3656.

We do not claim any of the above-described different parts separately; nor do we claim any part of the railway cooking stove, as patented by Isaac B. Bucklin, or other stoves with movable grates or fire chambers, as our invention. What we do claim therefor, and desire to secure by letters patent, is the arrangement and combination of the aforenamed several parts, as follows: The arrangement of the flues; openings in front and rear, in the bottom, below the oven plate—fig. 6; and, in combination therewith, the self-acting dampers, constructed and arranged as described, so as to enable us to do away with the sliding plate with boiler holes, as in Isaac B. Bucklin's patent, with his alternating openings on the top of fire chamber; and substituting in its place our improved fire chamber, (top fig. 7,) with its plates and rings as above described, with two openings or flues on the back end, (*c c.*) We further claim the combination of the vertical front, rear, and horizontal flues, with their dampers in their fire chamber, as represented in figures 2, 5, and 12. We expressly say, and wish to be understood, that we do not claim any of these above-described parts as new, but only in the combination described with Isaac B. Bucklin's patent railway cooking stove, or any other of similar construction—that is, with a movable fire chamber or furnace, moving to and fro under an oven; and as such we claim the invention, adaptation, and combination above named, as witness our hands.

JOHN B. CHOLLAR.
HOMER PARMELEE.

No. 3657.

I do not claim the double elliptical spring; but what I do claim is the combination of the above-described spring with the boot or shoe, in the manner and for the purpose described.

ISAIAH GALE.

No. 3658.

Having thus described my invention, what I claim therein as new, and which I desire to secure by letters patent, is the method of adjusting the case or concave, by revolving it around the cylinder as described, by means of the grooves, ways, and adjusting screw, in the manner and for the purpose above set forth, or by any other means substantially the same.

JACOB GROAT.

No. 3659.

Having thus fully described my machine for hulling and peeling rice, &c., what I claim therein as my invention, and for which I desire letters patent, is—1st. Constructing the revolving cone in the manner described, with alternate staves of brushes, and gum elastic and iron, or gum elastic and strips of iron, alone, combined and operating in the manner and for the purpose herein set forth. 2dly. I claim, in combination with the above-named revolving cone, a case formed of triangular-shaped files, as above fully made known. 3dly. I claim the method of combining the files with the upper and lower rings, so as to be adjustable in the manner before described, by inserting them in a groove, with soft pieces of metal between them, by means of which they may be driven close together, or separated, as occasion requires.

JACOB GROAT.

No. 3660.

What I claim as my invention in this machine, and desire to secure by letters patent, is—1st. The manner in which I have connected and combined the float and the check valve with the force pump and with the boiler, as herein described, so as to allow of any excess of water from the pump to return back thereto, by the opening of the check valve, under the action of the float. 2dly. The connecting of the second valve, placed in the pipe or opening, through which the water passes from the chamber to the boiler, with the check valve and float, so that both may be operated on by the float, for the purpose and in the manner described. 3dly. The connecting the float internally with the pump that supplies the boiler, by means of a hollow stem and valve, in combination with the check valve, so that the float may be exhausted at each stroke of the pump, and thereby be made to discharge any water that may have leaked into it.

JOHN COCHRANE.

No. 3661.

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the parts (*a b c*) constructed and arranged substantially in the manner herein set forth.

JOSEPH S. BARKDULL.

No. 3662.

What I claim as my invention, and desire to secure by letters patent, is the construction of the back piece and the front piece of the buckle, and the combination of the same on the lever principle, as above described—

causing the said front piece to be pressed firmly against the tug or strap, so as to hold the same securely, and thus dispense with the common buckle tongue.

HENRY LAWRENCE.

No. 3663.

What we claim as our invention, and wish to secure by letters patent, is the separator E, as above described—that is to say, a revolving screen or separator, composed of separate portions or sections of wire gauze, (E,) constructed and secured by endless belts (*i*) in the manner described.

JACOB V. A. WOMPLE.
GEORGE WESTINGHOUSE.

No. 3664.

What I claim as my invention, and which I desire to secure by letters patent, is the manner of ventilating the hives, by arranging them around a central vertical opening in the palace—the back of each hive being covered by wire gauze; and, in combination with this arrangement, the moth trap placed at the top and bottom of said central opening; the construction and arrangement being as herein described.

LEMON HAMLIN.

No. 3665.

Having thus fully described the nature of my improvement in the washing machine, what I claim therein as new, and desire to secure by letters patent, is the varying of the inclination of the dasher board, in the manner and for the purpose herein described and represented.

I likewise claim the application and use of the reciprocating wedge, constructed and operating as above set forth.

WILLIAM E. ARNOLD.

No. 3666.

I claim the above-described arrangement of the clamping plates and clamps, so as to extend entirely around, or in opposition with the lower edges of the boot former and have a space between the clamp plate, to receive and permit the depression of the boot former below, and its elevation above their upper edges, in the manner set forth; the said improved arrangement of the parts enabling the attendant to stretch and shape the leather more thoroughly, conveniently, and expeditiously, than by others heretofore used. And I also claim the wrinkle preventer, as applied to or combined with the boot former, and constructed and used substantially in the manner as hereinbefore set forth.

In testimony that the foregoing is a correct specification of my said invention, I have hereto set my signature, this 13th day of May, in the year of our Lord 1844.

PELATIAH STEVENS, Jr.

No. 3667.

What we claim as our invention, and desire to secure by letters patent,

is the connecting together the screws and sliding blocks on the head and foot blocks of the carriage, so as to move both ends of the log simultaneously and equally; and at the same time allowing the head block to recede from or approach to the foot block, and thus be adjusted to the length of the log to be sawed; the whole being arranged, combined, and connected, substantially as above set forth and described.

JOHN EATON.
FRANCIS M. STETSON.

No. 3668.

What I claim as my invention, and desire to secure by letters patent, is making the shield or shoe at the bow to consist of a combination of inclined surfaces, arranged as herein described, so as to depress and carry the ice under and on each side; the shield being as wide, or nearly so, as the extreme width across the paddle wheels, by which the boat is propelled.

In testimony that the foregoing is a true description of my said invention and improvements, I have hereto set my signature, this thirteenth day of March, in the year eighteen hundred and forty-four.

SAMUEL NICOLSON.

No. 3669.

What I claim as my invention, and which I desire to secure by letters patent, is—1st, the arrangement of the longitudinal bar F^2, and dogs (g, h,) attached to the ends of the slides of the head and tail blocks, for supporting the log at the middle, in the manner described above; 2d, the arrangement of the vertical plates K on the head and tail blocks, for entering notches made in the under side of the log, to prevent it having any movement longitudinally whilst being sawed as described.

HENRY STANTON.

No. 3670.

Having thus fully described the nature of my improvement, and shown several different modes by which the same end may be attained, without varying the principle of action upon which my improvement is dependent, what I claim therein as new, and desire to secure by letters patent, is the causing of one of the jaws of a vice (and that usually the front jaw) to swivel or turn in a socket, or on a gudgeon or joint pin, for the purpose of enabling it to embrace an article which may be tapering, or of unequal size at its two ends; the same being effected on the principle, or substantially in the manner herein set forth.

LAUREN M. PECK.

No. 3671.

Having thus fully described the nature and object of my improvement in the manner of constructing the grates of furnaces, I do hereby declare that I do not make any claim to the causing of steam to enter the furnace in conjunction with atmospheric air, by which the combustion is to be kept up; this having been previously done by conducting waste steam through

tubes arranged beneath the grate bars, such steam having been allowed to escape through lateral perforations made in said tubes for that purpose. But what I do claim as constituting my invention, and desire to secure by letters patent, is the manner herein described of protecting the fire bars from being burnt out, by causing the grate bars to dip into troughs which are kept supplied with water—said bars and troughs being combined and arranged substantially in the manner and for the purpose herein set forth.

JOHN KYMER.

No. 3672.

I hereby disclaim the original invention of sewing cloth by machinery with a running stitch ; but what I do claim, and desire to secure by letters patent, is the arrangement of the wheels A, B, C, and D, in combination with the needle, having but two bends, which allows the machine to work much better, being more simple in its construction, and thereby having five wheels less than the original machine. The advantages of my arrangement being—1st, that the needle, having but two bends, is not so liable to break ; 2d, one wheel less, that the cloth does not pass under ; and, 3d, the doing away with four wheels which gear into one another on the back of the machine.

In witness whereof, I have hereunto set my hand, in the city of New York, this nineteenth day of March, A. D. one thousand eight hundred and forty-four.

JAMES RODGERS.

No. 3673.

By such a combination of soaking or steaming, heating and pressing the tobacco, I completely restore it, or give to it the same (or very nearly the same) marketable appearance it possessed when first manufactured ; and, therefore, in concluding the description of my process of renovating tobacco, I wish to be understood that I claim the said process substantially as herein above explained.

In testimony that the above is a true description of my said discovery or process, I have hereto set my signature, this 13th day of June, A. D. 1844.

ENOCH HUSE.

No. 3674.

Having thus described my invention, I would wish it to be understood that what I claim consists in separating the ore from the refuse matter, &c., by subjecting the whole to the action of vertical (or nearly vertical) and horizontal (or nearly horizontal) currents of water in combination, whether these currents, or either of them, be produced in the manner herein described, or by any other suitable for the purpose.

I also claim the combining with the series of sieves a causing, (extending around or partially around the series, as set forth,) and a valve or valves *f*, *f*, (arranged with respect to the sieves as described, or in any other manner, so as to produce their intended effect ;) so that when the whole is placed in a tank of water, the upward and onward currents required for the process of separation above described, may be obtained by simply causing the series of sieves to move up and down, or in other respects as specified.

NICHOLAS TROUGHTON.

No. 3675.

What I claim as my invention, and desire to secure by letters patent, is a new mode of applying a fender to andirons, by the means of joints, hinges, slides, and hanging upon the bars, so that the andirons may be movable.

MORGAN MORGAN, Jr.

No. 3676.

Having thus fully described all the parts of the engine or apparatus which are necessary to an understanding of my improvements, what I claim therein as new, and desire to secure by letters patent, is—first, the within-described arrangement for blowing off the contents of the box C, by means of the pipe S, S, independently of the blowing off of the general contents of the boiler.

I claim the manner in which I have combined and arranged the small auxiliary steam engine, the fire engine, and the supply pump, with the supply pump, by which the action of the slide valve is regulated, and the water supplied to the boiler.

I claim the particular manner of regulating the cut-off of a steam cylinder, (herein described and represented in figure 3,) whether applied to the small auxiliary engine for filling the boiler, or to any other steam cylinder to which it may be adapted.

I claim the manner in which I have combined the double valve (*e' e'*) with the float and an auxiliary engine, for the purpose of insuring its ready action in the boilers of high-pressure engines. I do not claim to be the first to have used two valves upon one stem—this having been done in what is called the balance valve; but I do claim the special arrangement of the double valve in the combination, and for the purpose above described.

And I do hereby declare that I do not claim to be the first inventor of the application of an auxiliary engine made to operate by the agency of a float, so as to set in motion a supply pump for the supplying of a boiler—a method of doing this having been described by Isaac N. Coffin, and patented by him on the 13th day of September, 1839; but I limit my claim, as above specified, to the arrangement and combination of the respective parts of the apparatus, as herein made known. Nor do I claim the using of a box to enclose the float, excepting when this is done both at top and bottom, and in combination with a tube, such as is represented at H H; by means of which arrangement the float is guarded against the effects of foaming. And I do hereby further declare, that I do not intend to limit myself to the precise form and arrangement of the apparatus as herein described and represented, but design to vary the same as I may find expedient, whilst I attain the same ends by means substantially the same. I have, for example, now in operation on board the steamboat Croton, on Long Island sound, an apparatus constructed by me, and substantially the same with that herein described; but, instead of the single steam cylinder of the auxiliary engine, I have used two cylinders, the piston rods of which are attached to a three-throw crank shaft; two of the cranks having the two steam piston rods attached to them, and the third working the supply pump—an arrangement that will probably be preferred, as operating more steadily than the single cylinder engine.

DANIEL BARNUM.

No. 3677.

Having thus fully described the nature of my invention, and shown the manner in which the same may be carried into operation, what I claim therein as new, and desire to secure by letters patent, is the manner in which I govern the action of the slide valve of the auxiliary engine by the aid of the tappits, the vibrating piece *d*, the sliding piece *g*, and their appendages, as set forth. I claim the regulating of this action, whether the apparatus be constructed precisely in the form represented, or in any other in which a like effect is produced by means substantially the same.

HENRY R. WORTHINGTON.

No. 3678.

What I claim as my invention, and desire to secure by letters patent, is the combination, arrangement, and application of the lever L, (figure 2,) movable hands H, H, figure 2,) rachet wheels K, W, (figure 2,) springs and cylindrical tubes (figures 2 and 5,) as hereinbefore described, for the purpose of moving, adjusting, and controlling the log timber or other material to be sawed, preparatory to and during the process of sawing, together with the combination and arrangement of the aforesaid lever L, (figure 2,) hands, rachet wheels, springs, and cylindrical tubes, with the long shaft S, (figure 1,) bevel pinions, bevel wheels, spur pinions, and racks, in the manner hereinbefore particularly set forth, specified, and described.

WATERMAN P. PALMER.

No. 3679.

Having now described the nature of my said invention, and the manner in which the same is to be performed, I declare that what I claim as of my invention in the paddle wheels of steamboats, and of all other vessels, machines, or bodies, which are propelled or moved by the action of floats or other like contrivances in and against water, in oblique positions relatively to the shafts or axes, and in series of pairs, in oblique directions the reverse of one another, is the placing the inner extremity of each of the individual paddles or floats so as to project beyond the inner termination of the one opposite thereto, and said inner extremities being at such distance from each other as to admit of the passage of water between them, as represented in the drawing hereunto annexed. I do not claim the use of pairs of floats or paddles inclined towards each other, when such pairs meet and form an angular point—this having been often done; but I limit my claim to the particular arrangement of such pairs of floats or paddles as herein set forth and represented, but without confining myself to the precise angles or relative distances at which the floats are there represented to be fixed, and reserving to myself a right to place them at any more suitable angles or distances, by which the like beneficial results may be obtained.

In testimony whereof, I, the said Richard Dover Chatterton, hereto subscribe my name, in the presence of the witnesses whose names are hereto subscribed, on the first day of June, in the year of our Lord one thousand eight hundred and forty-four, at Coburg, in the district of Newcastle, in the Province of Canada.

RICHARD D. CHATTERTON.

No. 3680.

What I claim as my invention, and desire to secure by letters patent, is the combination with the bolting reel of the long vibrating reacting knocker or knockers, suspended within the reel, and acting, when in operation, upon the arms of the same, from one to the other at the same time, and reacting, when revolved to the opposite side, so as to keep the bolting cloth clear of dust, as herein described, without injury to the cloth, and preventing its slipping on the ribs of the bolter.

RYBURN BUCHANAN.

No. 3681.

I am aware that in machines for making nails, spikes, or bolts, &c., the piece of metal has been cut off and griped for the formation of the point and head, by means of three dies; and therefore I wish it to be distinctly understood that I do not claim simply the employment of three dies for cutting off and griping the piece. The dies in the machines heretofore known were for making nails, spikes, &c., from a rod, instead of a flat bar; and hence the arrangement of the dies, and some of the functions performed by them, differ in the above-described machine from those heretofore known; and therefore what I claim as my invention is the employment, in combination with the griping dies *j* and *k* of the die *l*, which performs the operation of cutting off the piece from the flat plate or bar, and constitutes the bed against which the roller K acts to reduce the nail, &c., to the required form, in manner substantially as hereinbefore described.

I also claim, in combination with the dies *j*, *k*, and *l*, (possessing the characteristics above given,) the die for performing the head of the nail, spike, &c., as described.

I also claim in combination with the dies *j*, *k*, and *l*, (possessing the characteristics above indicated,) the method of pointing the nail, spike, &c., in manner substantially as described. And, finally, I claim in combination with the dies *j*, *k*, and *l*, the piece or die *o*, which holds the piece of metal to be acted on against the die *l*, whilst it receives the action of the heading dies, as herein described.

S. G. REYNOLDS.

No. 3682.

Having thus fully described the nature of my machine for trimming the flaps of hinges, what I claim therein as new, and desire to secure by letters patent, is the manner of arranging and combining the dies and gauge, substantially as described and set forth in the foregoing specification, and represented in the accompanying drawings.

CYRUS KENNEY.

No. 3683.

Having thus fully described my improvements, what I claim as my invention, and desire to secure by letters patent, is the employment of the swing frame, (shown at figure 4,) constructed and arranged as above described, in combination with the edging and jointing machine, in the man-

ner and for the purpose herein set forth. I also claim the method of holding the staves for turning, in combination with the movable double motion cutter carriage, arranged and constructed as before specified.

HORACE BAKER.

No. 3684.

What I claim as my invention, and desire to secure by letters patent, is the spring H, being graduated by the screw 3, in combination with the sliding arm of the reel D, being constructed and operating substantially as herein described; and I do not claim the contra twisters 9 and 10, as shown in figures 5 and 6.

JAMES S. HARRIS.

No. 3685.

I am aware that it has been proposed to make large guns of staves and hoops, but not like those constructed by me. I do not, therefore, claim simply making guns of hoops, or rings and staves; but what I do claim as my invention, and desire to secure by letters patent, is making guns by uniting the rings of each layer by screwing them into each other; and also by screwing other layers or tiers on to the first, second, third, and so on to any extent, as described.

R. F. LOPER.

No. 3686.

What we claim as our invention, and desire to secure by letters patent, is the combination of the tumbler chock (*i*) with the receiver, in the manner and for the purpose herein set forth. We also claim, in combination therewith, the permanent chock, constructed and arranged as herein set forth. We also claim the lever and spring, in combination with the tumblers, chock, and receiver, arranged substantially in the manner and for the purpose described.

EDWARD SAVAGE.
SIMEON NORTH.

No. 3687.

Having thus fully described the nature and operation of my improved rotary printing press, what I claim therein as new, and desire to secure by letters patent, is the construction of a press furnished with a series of cylinders—say six, eight, or any other number, more or less, which may be preferred; which cylinders are provided with fingers for laying hold on the sheets, and are carried round by a continuous rotary motion in the same direction, substantially as herein described. I also claim the manner in which I have arranged and combined the inking apparatus, by attaching the boxes in which the gudgeons of said rollers run, to bands at each of their ends, and carying them under and over the form, and in contact with the distributing roller; the whole apparatus being governed and operating as set forth. I claim the manner in governing the fingers, in closing them upon the sheets, by the action of the sliding ring, and the cams or guides thereon, which operate upon studs on the finger shafts; the motion of the

sliding ring, and the other motions necessary to this action, being effected substantially as described. I claim the manner of governing the sliding boxes on the arms of the cylinders, by means of the guide groove X′ and the adjustable stud *z*, or by any other arrangement of the parts concerned therein, by which the same end is attained by equivalent means. I claim the manner of arranging the parts connected with the clasps, for taking the sheets from the cylinders and depositing them on the fly board; said parts consisting of the bars B′, B″, the vibrating shaft E′, the guide pieces I′, and their appendages, by which the clasp bars are opened and closed, and made to vibrate in and out, for the purpose and in the manner described. I claim the manner in which I govern the action of the feet L′, L′, causing them to perform the respective motions herein described; the parts principally concerned in said motions being the cylindrical rods *q*, *q*; the curved grooves *s*, in them; the spring M′, and their appendages, co-operating with each other, substantially as set forth.

And I do hereby declare that I do not intend, by the descriptions herein given, to limit myself to the precise form or arrangement of the respective parts, but to vary these as I may find convenient, whilst I do not depart from the principles upon which my improvements are dependent; but attain the same ends by means substantially the same.

RICHARD M. HOE.

No. 3688.

Now, what I claim as new, and as my invention in the above, for which I ask letters patent of the United States, is the constructing the leaches and vats, as herein described, so that the liquors pass through the top strainer of one leach into the bottom of the next, throughout the circuit, or direct to the pump, and are returned from the vats, after being heated, to the bottom of the leaches; and, in combination therewith, the arrangement of trunks, stocks, and spigots, by which I effect these objects.

I likewise claim the revolving rollers of the tanning and liming frames, for accommodating the hooks to the shrinking of the hides; and the manner in which I arrange the two shafts, connected and operating as herein described, for working the tanning and liming frames to which the hides are suspended, and in combination the reels and shafts for handling, bating, and washing; likewise, the manner in which I arrange the railroad and car with respect to the mill and the leaches, by which the bark is conveyed direct to the leaches, and deposited therein.

Given under my hand, this 15th day of April, A. D. 1844.

WILLIAM BROWN.

No. 3689.

Having thus fully described the mode in which I construct the improved scrubbing brush and block, what I claim as my invention, and desire to secure by letters patent, is the application of the joint and hinge to the scrubbing brush and block, whether in, on, or at the side, so as to operate in the manner and for the purpose herein described and set forth.

In testimony whereof, I have hereto set my hand, this 10th of July, 1844.

GEORGE CARVER.

No. 3690.

Having thus fully described the nature and operation of my machine for manufacturing butt hinges of malleable metal, and shown the manner in which the same operates, what I claim therein as new, and desire to secure by letters patent, is the method of bending the ends of the projecting pieces, which are to form the knuckles, by combining the rest, dies, and gauge, under an arrangement substantially as herein set forth, so as to adapt them to the partial formation of the knuckles of the butt hinges. I also claim the method herein described, of upsetting the knuckles of the butt hinges by providing the pressing dies with grooves and mortises, or openings, to hold the flap and receive the knuckles, for the purpose and in the manner described.

CYRUS KENNEY.

No. 3691.

Having thus explained my invention, what I claim and desire to secure by letters patent consists in the above-described mode of making the back of a corslet, viz: in constructing the same of two parts, and joining them together, and otherwise arranging them with respect to each other, as set forth, and connecting them by an elastic strap or straps, or other proper elastic materials, which have, or have not, means of increasing or diminishing their elastic force—the whole being substantially as above specified.

In testimony that the above is a correct specification of my said invention, I have hereto set my signature, this twenty-sixth day of June, A. D. 1844.

ALANSON ABBE.

No. 3692.

Having thus described our invention, what we claim, and desire to secure by letters patent, is as follows, viz: a movable cap, or ferule, applied to or slipped upon the inner air tube of the burner for the flame to act upon, instead of against the top of the inner tube, as heretofore arranged; also, the above-described mode of sustaining and arranging the supports of the glass chimney, with respect to the tube I, and milled rim thereof, by which, in connexion with the other mechanism, the wick is elevated and depressed; the ordinary kind of glass holder being thereby dispensed with, and the wick raised and lowered without burning the chimney, or lamp glass—thus preventing the chimney from being smoked on one side, or its interior surface, as often taken place in lamps where it is supported upon a glass holder, as ordinarily constructed—the whole of the above being substantially as hereinbefore explained.

In testimony that the foregoing is a correct specification of our said invention, we have hereto set our signatures, this twenty-seventh day of June, in the year of our Lord 1844.

WINSLOW LEWIS.
BENJAMIN HEMMENWAY.

No. 3693.

What I claim as my invention, and desire to secure by letters patent, is the employment of the rollers (*b*, *c*, and *g*) combined and arranged in the

manner and for the purpose herein set forth, in combination with the pattern for the purpose described.

WILLIAM FIELD.

No. 3694.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would have it understood that I do not confine myself to the precise details shown, provided the peculiar character of my invention be retained. But what I claim is, first, the mode herein described, of making soft metal vessels, by causing a thick piece of metal to be pressed in the required form by pressure of dies, as is described, in respect to the dies, figure 4. Secondly, I claim the making a screw, by pressure in dies, on the necks of metal vessels, as shown in figure 7. And, thirdly, I claim the making of metal screw caps by pressure in dies, as shown at figure 8.

JOHN RAND.

No. 3695.

Having thus fully described the nature of my machine for manufacturing scythe handles and other articles, and shown the operation of the respective parts thereof, what I claim therein as new, and desire to secure by letters patent, is, first, the manner in which I have arranged and combined the apparatus for sawing the stuff to the proper curvature—said combined apparatus consisting of the carriage A, the second carriage C, with its friction wheels *a*, *a*, the curved guide strips *c*, *c*, and the clips *d*, *d*, with their cylindrical stems received within holes in the ends of the second carriage C, substantially as set forth. I also claim the manner of arranging and combining the parallelograms, in which the vertical guide pieces G, G, and toothed feeding rollers I, I, are made to embrace, conduct, and direct the handle to be turned through the opening in the wheel D, D; the feeding rollers being made to revolve, and the other parts of the parallelograms being acted upon and governed as described. I claim the combination and arrangement of the parts employed in causing the cutter P, and the guides Q, Q, to approach and recede from the centre of the wheel D, during its rotation, as set forth.

JAMES EMBREE.

No. 3696.

What we claim as our invention, and which we desire to secure by letters patent, is—first, the arrangement of the wings F, in the manner and for the purpose set forth; second, the combination of the permanent inclined rectangular screen K, with the revolving cylinder screen L, as set forth.

THOMAS COLE.
JOHN LITTLEFIELD.

No. 3697.

I do not claim making the truck frame of a railroad car, or carriage, with side truss frames united with diagonal braces, as this has been known before; nor do I claim making these frames of iron, or other metal. But what I do claim as my invention, and desire to secure by letters patent, is making

the trusses of the truck frame, that are united and braced together by means of twisted diagonal plates C, C, D, D, of arch plates A, A, and tie bars B, B, F, F, so arranged and bolted together as to embrace and secure the pedestals as described; by which arrangement I obtain the necessary strength with a greatly reduced weight, and employ the pedestals for the double purpose of holding the boxes of the wheel axles, and connecting the tie bars of the trusses.

CHARLES DAVENPORT.

No. 3698.

Having thus described the nature of my invention, and the manner of performing the same, I hereby declare that what I claim as my invention, and desire to secure by letters patent, is the improvement in the manufacture of iron, steel, copper, and other metals, by the use and application of electricity, as hereinbefore described.

ARTHUR WALL.

No. 3699.

Having thus fully described my improvement in the manner of forming the lands and furrows in the dressing of the faces of millstones, what I claim therein as new, and desire to secure by letters patent, is the depressing of the outer edge of the bed stone flat and smooth, to an extent and in the manner set forth; and the depressing of that part of the runner that corresponds thereto, with lands usually eight in number, and having their direction the reverse of those on the other part of the face, as described and represented, and for the purpose set forth.

JOHN BLACK.

No. 3700.

Having thus fully pointed out the manner in which I construct or form my wheel, and shown the characteristic difference between it and those previously made, which approach it most nearly in construction, what I claim therein as new, and desire to secure by letters patent, is the casting of such a wheel with a single continuous plate or disk uniting the chilled rim to an undivided hub; said plate being so formed as that a plane bisecting the wheel in its axis shall present a waved line, or one having a convexity on each face of the wheel, in the manner herein described and represented, and for the purpose set forth.

EBENEZER A. LESTER.

No. 3701.

What I claim as my invention, and which I desire to secure by letters patent, is making the gauge plate E*e* E^2 in two parts—one permanent and the other movable—and called a shifting gauge; to gauge the length of the motion of the carriage, to correspond with the length of shingle to be cut, as described. I also claim connecting the dogs D to the rack gauges *i*, by means of the bolts *h* in the connecting rods *m*, and the oblong slots G in the heads of the rack gauges *i*; by means of which arrangement the same

thickness is given to the butts and points of the shingles, whatever may be the difference in their length, by the same motion of the rack gauges *i*, as described.

J. G. JOHNSON.

No. 3702.

Having thus described the nature of the invention, and the means pursued by me in performing the same, I do not confine myself to the precise details herein explained, provided the peculiar character of the invention be retained; but claim to deposite silver on glass from an oxide of that metal in solution, by the new process substantially as herein described, wherein I make use of suitable deoxidizing matters, in such manner as to cause the silver to adhere to glass, without any previous preparation of metallic coating.

THOMAS DRAYTON.

No. 3703.

What I claim as my invention, and which I desire to secure by letters patent, is the combination of the revolving scroll *c* and trunk A, D; and also, in combination therewith, the wheel I, K, arranged and constructed as described.

DAVID PUTNEY.

No. 3704.

What I claim as my invention, and desire to secure by letters patent, is making either the tonguing or grooving tool self-adjusting, by arranging the box or bearing of the shaft of either of the said tools, so as to slide laterally on a rail, and connecting said box or bearing to a sliding guide bar *d*, which is governed or regulated in its movements by the edge of the board, and kept up against said edge by means of a weight operating on it, (so as to press it laterally,) through the medium of a rack and pinion, as hereinbefore set forth—the mechanical arrangement and operation being substantially as hereinabove specified. I also claim the combination of sliding bolts N', S', with the turning rod o', o', (having right angular arms n', n', p', p',) and pawl i', and rachet wheel k', on the end of the shaft which the weight i' turns or revolves; said combination being arranged substantially as hereinbefore set forth, and for the purpose of permitting or checking the operation of said weight i upon the sliding guide bar d', as hereinbefore specified.

In testimony that the foregoing is a true description of my said invention and improvement, I have hereto set my signature, this 29th day of July, in the year 1844.

CHARLES W. BROWN.

No. 3705.

Having thus fully described my machine and its operation, I wish it to be understood that I do not claim as my invention the taking air in at the centre below, and blowing it out through the cylinder and concave, as that

has before been done ; nor do I claim making an upward blast, for the same reason. But what I do claim as my invention, and desire to secure by letters patent, is the combination of fans substantially as herein set forth, so as to cause an upward and an outward blast in the manner herein described.

JOHN PAGIN.

No. 3706.

What I claim is combining with the common currycomb the serrated semicircular plate and the scraper, in the manner described.

THOMAS WILKINSON.

No. 3707.

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the cylinders E E with the guides F F attached, and their agreement with the slides H H, by means of which the capacity of the engine may be enlarged or diminished at pleasure. I do not claim the invention of vibrating cylinders, but I do claim the invention of the application of the vibrating cylinders E E to the purposes of pumps for fire engines, operating in the manner hereinbefore described. I also claim the opening X X, in the upper ends of the guides F F, on which the connecting pins I I act; and I claim the opening P through the arbor C, fig. 4, and the corresponding openings S S, fig. 7, serving for water passages.

GARDNER BARTON, Jr.

No. 3708.

What I claim as my invention, and desire to secure by letters patent, is the box for keeping sweet potatoes ; said box being constructed with ventilated sides and air tubes, the arrangement and construction of which is substantially as above described.

AARON H. VESTAL.

No. 3709.

What I claim as my invention, and desire to secure by letters patent, is the curved iron braces which connect the two sides together, in combination with said sides, and the tongue constructed for the purpose, and arranged in the manner above specified.

WILLIAM DYZERT.

No. 3710.

Having thus described my improvement, I shall claim the machinery for sustaining the stick, and giving to it a cylindrical form, in combination with that for reducing the cylindric of the stick so as to form the body (of the spool or bobbin) or part on which the thread is wound, with that for cutting off sections or parts of the stick of the length to form spools or bobbins, and with that for drilling or boring the hole through the axis of the stick or spools ; the whole arranged and operating substantially as set forth.

In testimony that the foregoing is a true and exact description of my

said invention and improvement, I have hereto set my signature, this 7th day of March, in the year 1844.

JONATHAN H. CARY.

No. 3711.

1st. We claim as new, and of our invention and discovery, and desire to secure by letters patent, the mode described of dressing the stones with curved furrows, with the circle cut in the *reverse* direction from those hitherto used; said furrows being widest and deepest near the eye, and the furrows of the runner being *hollowing* or *fluted* from the front or farther edge to the back, while those of the bed stones are cut in an angular form from the front to the back, in combination with the mode described of forming the eye of the runner conical or bell-mouthed below the upper part of the bail, when such modes of dressing or combination are employed, with stones made and driven as herein described, and applied to any description of stones in which they may be equally available. 2d. We claim in like manner the mode described of applying the action of a governor similar to that used with the steam engine, to operate through the lever C, rod *m*, and cross lever *n*, to act on the runner, and freed when any variation occurs in the speed through the action of the lever *o*, slide 5, and rod 6, to raise or lower the shoe *p* on its joint 7, substantially as herein described.

In witness whereof, we have hereunto set our hands, in the city of Brooklyn aforesaid, this 6th day of July, 1844, in presence of the witnesses subscribing hereto.

JOHN ANSELL.
JAMES GALLERY.

No. 3712.

And what I claim as my invention is the dovetailed wedge in combination with the spring holdfast at one edge of the wedge, to prevent its receding or working out of the chair, and thus permanently securing the rails at their junction in the chair.

BENJAMIN BUTTERFIED.

No. 3713.

Having thus fully described my invention, what I claim therein as new, and for which I desire letters patent, is arranging the double series of rollers (*e* and *i*) in a circle, in the manner described, and combining therewith the rod *r*, or other suitable carrier for taking the clothes round between the rollers, in the manner and for the purpose herein specified.

DAVID KAUFMAN.

No. 3714.

What I claim as my invention, and desire to secure by letters patent, is the combination of the large cylinder A, the small cylinder B, with its perforations (*b*,) and flange (*b′*,) and an apparatus for withdrawing the cream from the large cylinder, raising it in the small cylinder, and discharging

it again into the large one; not, however, confining myself to the screw D for that purpose, but substituting any other contrivance by which the same result can be obtained.

THOMAS LING.

No. 3715.

I claim as my invention the combination of mechanism, which acts in such a manner as to connect the dog (m') alternately with the gear (d',) and the wooden pulley (k',) as described in these specifications. I also claim as my invention the combination of mechanism for elevating the side of the carriage next the attendant, in such manner as to secure the proper degree of bevel for the stuff to be sawed—the same being effected by means of the three levers (a^4, b^4, e^4,) suspended by hinges and the two upright antagonist levers (g^4, r ,) and the connexion between them; and also the combination between these and the horizontal lever, &c., as described in these specifications.

E. C. GILMAN.

No. 3716.

What I claim, and desire to secure by letters patent, is the hanging the inking rollers in the manner above described, in the working frame provided for them, by means of which they are made conformable in passing to the curve of the cylinder and the face of the type, and so as to be adjusted thereto at discretion. I also claim the combination of a frisket with the said machine, in the manner and for the purpose above described.

ALONZO GILMAN.

No. 3717.

Having thus fully described the nature of my machine for bending the projecting pieces on the flaps of butt hinges, so as to form them into knuckles, and having also shown the manner in which the same operates, what I claim as new therein, and desire to secure by letters patent, is the so combining and arranging its parts, in the manner set forth, as that the pieces to be bent shall first have one-half of the intended curvature given to them by dies formed and actuated in the manner of those shown at *i*, *b*, *c*, in the accompanying drawing; and shall subsequently have the bending completed by means of a die, check piece, bed, and gauge piece, such as are shown at *i*, *h*, *e*, and *f*, in the said drawing; the respective parts of the whole machine being arranged and actuated substantially as herein fully made known.

CYRUS KENNEY.

No. 3718.

What I claim as my invention, and desire to secure by letters patent, is the combination of the perforated scoop B, and runners A, with the levers J, G, rods, I, K, L, M, and apparatus P, for discharging the scoop—constructed and operating in the manner above set forth.

JOSEPH SMITH.

No. 3719.

Having thus fully described the manner in which I construct my machine for making round splints for matches, and having also explained the operation thereof, what I claim as new, and constituting my invention, is combining with the tube-cutters the flanch or wing, for the purpose and in the manner herein described, whether the tubes are made in sets or in single tubes; and also the combination of the movable lip with the follower, (the wedge and tube cutters,) in the manner and for the purpose herein set forth. And I do hereby declare that I do not intend, by the description herein given, to confine myself, in the second claim, to the precise shape or form or manner of arranging and connecting the auxiliary parts of the feeding apparatus, or to the peculiar form or arrangement of the tube cutters, but to vary them as I may find expedient, whilst the general construction and operation of the feeding apparatus is substantially the same with that herein set forth, and whilst it is made to retain those features which distinguish it from all other machines which have heretofore been constructed for the same purpose.

HERVEY LAW.

No. 3720.

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the cams (*e* and *f*) upon the rocking shaft or cylinder (E,) in combination with the follower and the segmental cam (*r*.) And, in combination with the above, I also claim the cam (*g*,) and sliding rod (F,) for operating the lid; the whole arrangement and operation being substantially as herein above described.

JEFFERY SMEDLEY.

No. 3721.

What I claim as my invention, and desire to secure by patent, is the *knife* designated by the letter C in the drawing, in combination with the *revolving cross arms* (letters *f*, *f*,) driven by the *bevelled cog wheels*) letters *c*, *c*,) *arranged and constructed as described*; and also the arrangement of the *knife* and *revolving cross arms in combination with the ear* (*a*, *a*,) and guiding rod (*h*, *h*,) and all as described and seen by the drawing and letters referred to as part of, in these specifications, the accompanying drawings, references, and explanations.

In testimony that the above are my specifications, I hereunto set my hand.

JACOB PECK.

No. 3722.

Having thus explained my invention, I shall claim the employment as a governor of a screw, or other analogous contrivance as described, to revolve in water or other fluid, and act therein; and in all respects substantially as set forth.

HENRY BURT.

No. 3723.

Having thus fully described the construction and operation of my machine for cutting sausage meat, what I claim as my invention, and desire to secure by letters patent, is the combination of the revolving and parallel knives, and, in combinationt herewith, the piston forcing the meat through the parallel knives.

EDWIN CLARK.

No. 3724.

What I claim as my invention, and desire to secure by letters patent, is the mode or manner in which I obtain iron, or other metallic castings, or second patterns of nearly uniform thickness, by means of spreading any suitable material or composition on the face of the aforesaid plaster cast, in thickness equal to the thickness of the iron, or other metallic castings, or second patterns afterwards to be obtained, and the principle involved in such mode of proceedings.

EZRA RIPLEY.

No. 3725.

I only claim as new, and of my own invention and discovery, and desire to secure by letters patent, the application of the arrangement and combination of the vessels A, B, and C, with the pipes, cocks, and valves, as described, when such application, arrangement, and combination, are employed for the two-fold purpose of raising fermented or other liquors from the casks to the place where it may be drawn for use; and of preserving the liquor itself, by maintaining a considerable atmospheric pressure on the surface of the liquor within the cask, substantially as described.

In witness whereof, I have hereunto set my hand, in the city of New York, this twenty-eighth day of June, one thousand eight hundred and forty-four.

RICHARD SEALY.

No. 3726.

What I claim as my invention, and desire to secure by letters patent, is the combination of the revolving wheel and cams with the rollers and knives, for splitting and dressing pieces of wood, as before described.

W. ROSE.

No. 3727.

What I claim as my invention, and desire to secure by letters patent, is the manner of changing the position of the knife, so as to bring the cutting edge to the centre of the hoop pole, whatever its diameter may be, by means of the aforesaid combination of suspended knife stock G, crutch bar (*f*,) and oblique adjustable J, or other means substantially the same.

W. ROSE.

No. 3728.

I claim as my invention, under the foregoing specification, the following parts of the machine above described, viz: The upper mould, or "movable ball," or "tip iron," (exclusive of its heater holder,) and consisting of the wedge and two half moulds, with their pins and grooves, as above described, for expeditiously filling out and moulding tips for hats and bonnets during the process of drying, without sticking to the mould. The same is marked E, and K, and L, and M, and N, in the annexed drawing No. 1; and the parts thereof (F and G) in the said drawing No. 1. I claim it as my invention, of whatever material it may be made, and as the same is described in said specification, and the plan whereby it is made to expand, so as to fill the cup when pressed down, and to contract so as to easily separate from the tip when moulded, and so as to pass through the forceps with facility when lifted up, and without necessarily opening the latter. I claim this as invented by me, to be used in combination with the upper and lower heater holder with the lower cup, and with the moulding forceps or tongs, and for the purpose aforesaid.

In testimony whereof, I, the said Thomas Kendall, hereto subscribe my name, in the presence of the witnesses whose names are hereto subscribed, the 4th day of May, A. D. 1844.

THOMAS KENDALL.

No. 3729.

What I claim as my invention, and desire to secure by letters patent, is the combination of the two horse shove-springs E, E, connected together by means of the swivel box and clevises or clasps, with the elliptical springs, in the manner and for the purpose specified.

ERASTUS T. SPROUT.

No. 3730.

Having thus fully described the manner in which I construct and arrange my apparatus for warming apartments, and also shown the operation thereof, what I claim therein as new, and desire to secure by letters patent, is the manner in which I have connected the boiler with the series of tubes or pipes, through which heated water is to circulate, by combining therewith a box or vessel, such as that which I have denominated a water trap, into which the boiling water is to pass, in consequence of its ebullition; and through which, as well as through the tubes (J J) connected therewith, and through the boiler, said water is to circulate, for the purpose and substantially in the manner above set forth. As the form of this apparatus may be changed in various ways, whilst its principal operation will remain the same, it is to be distinctly understood that I do not intend to limit myself to the particular form and arrangement of the respective parts herein described and represented, but vary these as I may find expedient, whilst I attain the same ends by means substantially the same

BENJAMIN BLANEY.

No. 3731.

What we claim as new in the above-described machine for pressing brick

is the manner in which we have arranged the models and pistons, or followers; the moulds and followers being affixed on either end of a slide, and said slide being moved back and forth, and the brick pressed against a stationary plate or head, in the manner described—the whole arrangement being substantially such as is herein set forth.

COLLINS B. BAKER.
E. GIFFORD.

No. 3732.

Having thus fully described the nature of my improvement in the steam engine, what I claim as my invention, and desire to secure by letters patent, is the method of working the condenser of the steam engine, without the aid of an air pump, by so combining it with a valve which opens from an escape pipe into a water heater, and with a foot valve which discharges into the open air, or into a reservoir of water; by which combination the steam that enters the condenser escapes partly through the upper valve into the heater, to heat the water for the boilers, and carrying with it a portion of the air from the condenser; and partly through the foot valve, carrying with it the water and air of the previous condensation; and when, by these operations, the elastic force of the steam is reduced below the atmospheric pressure, the valves are closed, and the remaining steam condensed—all as described. I likewise claim the manner of preventing the water from flowing from one boiler into another, when the boat careens, by means of the tubes as above described and represented.

BENJAMIN CRAWFORD.

No. 3733.

Having thus described my discovery in the manufacture of sal æratus, that which I claim, and desire to secure by letters patent, consists in the employment and use of anthracite—*i. e.* its volatile products of combustion, in connexion with steam, without any purifying process of the volatile products of combustion, other than the separation of fine dust, as set forth; the whole being substantially in the manner and for the purpose as hereinbefore specified.

In testimony that the above is a true description of my said discovery, I have hereto set my hand, this 3d day of July, A. D. 1844.

EDWARD CHAMBERLIN.

No. 3734.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would wish it to be understood that I do not confine myself to the details here shown and described, so long as the peculiar character of either part of my invention be retained. And I would have it understood that what I claim is arranging the teeth of the "working" combs, at variable and decreasing distances apart, from one end of the comb to the other, as set forth, (whether the said comb consists of a straight row of teeth, or several circular rows or cylinders,) in combination with arranging the said teeth in such manner that, as they increase in distance asunder, they shall increase in distance from the teeth of the carrying

combs; or, in other words, arranging the teeth of the working combs at increasing distances apart from each other and from the carrying combs, as hereinbefore set forth.

Also, giving to each of the rotary working combs, when revolving and working with the teeth of the endless carrying combs, a movement towards the common axis of the set of rotary working combs—the same being for the purpose specified. Also, the manner of discharging wool from the teeth of the working combs, viz: by means of the sliding plates *e*† *e*†, &c., applied to the said teeth, and operated as set forth.

Also, I do not claim the employment of one or more sets of feed rollers, for supplying the carrying combs with the fibrous material; but what I do claim consists in the above-described manner of arranging and operating those feed rollers with respect to the carrying combs, or teeth thereof, so as to cause them to lash, lay, or apply the wool upon the said teeth, as specified; the said feed rollers and carrying teeth, being arranged with respect to each other as seen in the drawing entitled "section of the apparatus for filling the comb (*b*) with the wool or hair;" and being operated, or depressed and elevated, as hereinbefore described.

G. E. DONISTHORPE.

No. 3735.

Having thus set forth my invention, I shall claim the combination and arrangement of the burner and fountain containing the float, with the air and oil passage between them, substantially in the manner described. Also, forming one or more openings through the inner side of the upper part of the fountain, for the escape of the air and surplus oil, in the manner and for the purpose as set forth.

EDWIN B. HORN.

No. 3736.

And whereas I claim, as my invention, the application of a separate steam cylinder or engine, (but which may be worked by steam from the same boiler,) for working the exhausting apparatus, by which the vacuum is kept sufficiently perfect in the case of the main revolving wheel, instead of depending on the revolution of the main revolving wheel itself, to work the exhausting apparatus for producing the required vacuum for it to revolve in; and whereby I obtain the following advantages, not attainable by the said original patented invention, viz:

1st. I am enabled to direct more of the power of the main engine upon the main shaft of the propeller, or work to be performed by said main shaft.

2dly. I am enabled to keep the case E constantly exhausted, even when the main revolving wheel is at rest, so that it may start with full power at any time.

3dly. I am enabled to obtain the necessary vacuum without disturbing the propelling arrangements of the main engine, or robbing it for that purpose of any of its power.

4thly. I am enabled, by increasing the action of the exhausting apparatus, to admit a greater quantity of steam into the case E, and thus, in cases of emergency, to increase the power of the engine.

5thly. I am enabled to use the waste steam from the steam cylinder of

the exhausting apparatus, by afterwards directing it upon the fanes of the main revolving wheel, in the case E. And I hereby declare this to be the specification of my said improvement and invention.

In witness whereof, I hereunto set my hand, this 22d day of November, 1842.

EDWARD LOCKE.

No. 3737.

I claim the sliding saw in combination with the scow, or other floating body, for the purpose as hereinbefore specified.

In testimony that the foregoing is a correct specification of my said invention, I have hereto set my signature, this sixth day of September, in the year of our Lord one thousand eight hundred and forty-four.

ERASTUS C. COLE.

No. 3738.

What I claim as my invention, and desire to secure by letters patent, is the combination of the knocker Y, with the sieve, or other suitable apparatus, for distributing the sand, glass, emery, or other material, and with appropriate rollers and brushes, whether arranged precisely in the manner herein described, or in any other that is substantially the same, producing a like result by analogous means.

EDMUND MORRIS.

No. 3739.

All that I claim in the before-described arrangement, and for which I ask letters patent, is suspending the swinging fulcra of the pressing levers of the follower to the head block or cap of the frame, against which the substance is pressed, in the manner and for the purpose set forth.

WILLIAM F. PROVOST.

No. 3740.

What I claim as my invention, and which I desire to secure by letters patent, is the before-described peculiar construction of the buckets B of the wheel, as shown in figs. 1 and 2; that is to say, starting from the top of the hub A, at the circumference thereof, and diverging from it at B^1, in a spiral manner, to the middle of the bucket at B^2, from which point it gradually approaches the next succeeding bucket till within such distance as is requisite to form a narrow issue (B^3) descending from the upper edge of the bucket, at an angle of about 45 degrees with the bottom thereof, to which it unites near the bottom of the next bucket.

ROSWELL COOK.

No. 3741.

Having thus fully described our improvement, what we claim therein as new, and desire to secure by letters patent, is the combination of a series of compartments, in the manner and for the purpose described. We also claim the combination therewith of the bait bags, as herein specified.

WILLIAM CARR.
JOHN CARR.
JACKSON SHANNON.

No. 3742.

We do not claim the separate use of either of the ingredients mentioned; nor do we confine ourselves to the details herein set forth, so long as the peculiar character of the invention be retained. But we claim the introduction into the melted iron, &c., of a compound of sulphur and a nitrate, either alone or combined with either or all the ingredients enumerated in the foregoing description, as described, whether the proportions hereinbefore given be followed or changed.

THOMAS SOUTHALL.
C. CRUDGINGTON.

No. 3743.

What we claim as our invention, and desire to secure by letters patent, is—1st. The application of the circular shears, in combination with the guards, to regulate the hold which the cutters take upon the raw hide, as herein described. 2d. The application of the traversing pin, as an axis for the circular sheet of raw hide to revolve upon, and to carry the hide by a lateral movement towards the shears, in combination with the shears and guards, as herein described.

WILLIAM MARSHALL.
JOHN B. THURSBY.

No. 3744.

Having thus fully described my improved apparatus, and the operation thereof, what I claim as my invention, and desire to secure by letters patent, is the combination of a series of separate and complete inking fountains, constructed and arranged substantially as herein described, with a common inking apparatus, so as to impart to the ordinary inking roller various colored inks at one operation, in the manner and for the purpose before set forth.

THOMAS F. ADAMS.

No. 3745.

What we claim as our invention, and desire to secure by letters patent, is the employment of a turning, floating, or swinging gate, or a gate of any other form, for the purpose of excluding water from the basin above described, to be used in combination with the said basin and the elevating or floating dry dock above mentioned.

RUTHERFORD MOODY.
S. D. DAKIN.

No. 3746.

I claim as my invention and improvement the coating of sheets or plates, or pieces of iron or of copper, by combination of the two operations above described, in the manner above set forth, or any other substantially the same, whereby the sheets, or plates, or pieces of iron or of copper, are first coated with tin by precipitation, and then passed through a bath of molten

metal, as above described, in order to give the second coating. I further claim as my invention and improvement, the machine or apparatus for coating of plates, or sheets, or pieces of iron or of copper, by passing the same through a bath of molten metal—said apparatus or machine being constructed and arranged in the manner described, or in any other manner which is substantially the same. But as the process of coating, first by precipitation, and secondly by means of a bath of molten metal, may be combined, and consecutively used without the aid of the machine herein described, and as I believe this combined process to be substantially new, I claim said combination, whether the second process be performed by the aid of the machine, or by that of dipping, in the ordinary way.

By the use of the above improvements, a considerable saving of expense is made in coating sheets or plates of iron and copper, especially of the larger kind; and when made, the same are of superior quality.

ED. P. MOREWOOD.

No. 3747.

Having thus described the manner in which I construct my improved lock, and shown the operation of the same, I do hereby declare that I do not intend to claim as my invention the whole of the devices herein set forth—many of the individual parts having been before known and used. But what I do claim as new, and desire to secure by letters patent, is—

1. The manner of arranging and combining the followers *f* with their jaws 6, 6, the tumblers with their elbows *c'*, and the auxiliary followers with their lips *s* and the slides *g*, with tongues 8; by which arrangement and combination the action of the tumblers *c*, and of the auxiliary followers, becomes independent of, and does not indicate the position of the followers and slides when any pressure is made to act on the talon for that purpose; not intending by this claim to limit myself to the precise form and arrangement of the respective parts, but to vary them as I may think proper; whilst the said arrangement and combination remain substantially the same with those herein set forth.

2. I claim the manner of arranging and applying the guard plates *a* and *b*, which form two distinct departments in the lock, which is for the express purpose of preventing any discovery, by the agency of light, of the position of the main acting parts hereinbefore named, upon which the security of the lock is dependent; or of effecting the same by means of picks, or otherwise—such guard plates being arranged substantially as herein made known.

ROBERT NEWELL.

No. 3748.

What I claim is the manner in which I construct my rattoon cutter and plant-cane scraper, as above described and specified; that is to say, I claim attaching to the bottom the two sled runners A and B, (see fig. 2,) the curved knives F and G, (see fig. 2,) in the manner substantially set forth above; and, in combination therewith, I claim the fluke H (see fig. 2) for clearing off the trash and dirt, constructed and arranged substantially as set forth above, in the foregoing description. I also claim the combination of the roller E, (see fig. 2,) with the above arrangement of knives—

said roller being arranged in the manner and for the purpose set forth in the above specification and description.

N. LAUVE.

No. 3749.

What I claim is the mode herein set forth of securing the packing between the condenser and the coffee pot, by means of the ring covered with cloth, and the turned edge of the condenser, (*a*,) by which it is fastened.

D. ROWLAND.

No. 3750.

What I claim as my invention, and desire to secure by letters patent, is the introduction into block letters, block numeral figures, ornamented mouldings, cornices, and ornamental parts of buildings, of a coloring matter behind a plate of glass, or other transparent substance, in a manner which shall render it permanent, and not liable to be tarnished by exposure to the air and moisture, in the manner herein set forth.

LEWIS KATEN.

No. 3751.

What I claim as my invention, and desire to secure by letters patent, is—

1. The combination of a sliding bed, in which the grooves are cut for the reception of pins, with the stationary curved conductor, combined and arranged substantially in the manner and for the purpose herein set forth.

2. I claim the stationary conductors E, E, having two inclined bars with a downward curvature at the ends, as described, and in combination therewith the gutters F, F, on each side, into which the surplus pins pass, and are carried off the triangular piece, (*e*,) aiding in the operation. In the above claim, I wish it to be understood that I do not claim the inclined conductors when made straight, but only with the curved terminations.

DE GRASSE FOWLER.

No. 3752.

What we claim as our invention, and desire to secure by letters patent, is—First: the combination of a spring balance with the various kinds of lever balances to which it may be adapted, for the purpose of rendering the weighing of merchandise more easy, certain, and expeditious; and this we claim, whether the spring balance be used with or without our improvements upon it herein described.

Second: We claim, in combination with the spring balance herein described, the addition of a second hand.

Third: We claim the spring balance herein described, consisting of the modes of preventing the trembling motion of the hands, viz: the liquor cylinder L and dasher M.

JAMES H. BULL.
RICHARD H. BULL.

No. 3753.

What I claim as my invention, and which I desire to secure by letters

patent, is making the stove with an additional flue around the oven, in the manner and for the purpose above set forth.

JAMES LEWIS.

No. 3754.

Having thus explained our improvement, we shall claim the same—that is to say: connecting the lower ends of the hames and bearers substantially as set forth, and for the purposes as hereinbefore described.

In testimony that the above is a correct specification of our improvement we have hereto set our signatures, this 20th day of August, A. D. 1844.

JOSEPH K. SLATER.
SYLVANUS G. PRATT.

No. 3755.

What I claim as constituting my invention, and desire to secure by letters patent, is the manner in which I have combined the action of the cut-off and steam valves, by means of the arm E attached to the stem of the steam valve, and the movable or sliding cams or stops made adjustable on the stem C of the cut-off valve, for the purpose of regulating the cutting off of the steam by the action of the respective parts, as herein described and made known.

BARNABAS H. BARTOL.

No. 3756.

Having thus described the nature of my invention, I would have it understood that I do not confine myself to the precise details herein described; and it will be evident that the directions of the strengthening cord bands or lines may be varied, so long as the peculiar character of my invention be retained; but what I claim is the mode of manufacturing sails, by applying strengthening cords, bands, or lines, crossing each other on opposite sides of the sail, in such manner as to support the canvass at intervals, as described, and thereby give additional strength to sails for ships and vessels.

ARCHIBALD TRAIL.

No. 3757.

Having thus fully described my improvements and their operation, what I claim as my invention, and desire to secure by letters patent, is the combination of the triangular horizontal knife and shield, in the manner and for the purpose set forth. Lastly, I claim the combination of the conductors with the mould boards, in the manner and for the purpose herein specified; said mould-board being made to stand under at its front edge, to facilitate its clearing.

EDWIN OWEN.

No. 3858.

Having thus fully described the nature of my apparatus for the preservation of fruit and other vegetables, and shown the operation thereof, what I

claim therein as new, and desire to secure by letters patent, is the so constructing of said apparatus (in the manner herein described) as that the substances contained in the preserving compartment may be subjected to the influence of the ice deposited on the covering E^1, in conjunction with that of the ice-cold water produced by its melting; or the additional influence of a thin stratum of ice surrounding the sides of said compartment; or the moderate temperature produced by the supplying of water to the tubes or troughs *e*, *e*; the respective parts being combined, arranged, and operating, substantially as herein set forth.

PETER KEPHART.

No. 3759.

What I claim as my invention, and desire to secure by letters patent, is the application of detents or a detent cylinder to the lever, as it is used with the roller and jewel pin in the lever watches now in use; also, the manner of constructing my detent cylinder, as herein described. Also, the arrangement attained in the use of the detents or detent cylinder as combined with the lever, as herein described; together with the placing of each of the three axles of this escapement, so that, by their relative position with each other, they shall produce, in connexion with the detents or detent cylinder, the above-described locking and unlocking of the teeth of the scape wheel, so that the balance shall receive its impulse on the jewel pin at the time the tooth shall pass the whole distance from one detent to the other, it being $\frac{9}{10}$ or a greater part of the distance from the point of one tooth to the point of the next; and shall pass the remaining tenth, or lesser distance, as it is unlocked, by the balance returning, as herein described. And I also claim the right of applying my escapement in the construction of chronometers, watches, clocks, and such other instruments or machines to which it may be advantageously applied.

ORAMEL W. WASTE.

No. 3760.

What we claim as our invention, and desire to secure by letters patent, is combining the pad having a motion on its own axis with the mainspring of the truss, by means of the jointed lever *c*; the construction, arrangement, and operation of the whole being substantially as herein above described.

CHARLES C. REINHARDT.
VALENTINE CARTER.

No. 3761.

Having thus described the nature of my improvement in the therapeutic chair, and shown the manner in which the respective parts are arranged and operate, what I claim therein as new, and desire to secure by letters patent, is the manner in which I have combined the seat, the back, and the apron, with each other, and with the lower segment or legs of the chair, as herein set forth; by which combination and arrangement, the person occupying the chair is enabled, by the action of his own gravity, to govern the position of the movable parts—they being connected and combined substantially as herein set forth.

JAMES G. HOLMES.

No. 3762.

Having thus fully described the improvement of the said Ithiel Town, what I claim therein as new, and desire to secure by letters patent, is the method of constructing bricks of the forms herein described, in the manner and for the purpose set forth; having the interior hollow, and intersected with partitions, as described.

W. T. PETERS,
Executor of the estate of Ithiel Town.

No. 3763.

Having described the manner in which I construct my improved water wheel, and shown the operation thereof, what I claim as new therein, and desire to secure by letters patent, is the peculiar spiral form which I give to the channels of said wheel, from their upper ends to their delivery openings; such form being, in all cases, substantially the same with that herein fully made known. I likewise claim the lessening of the delivery openings, by means of gauge plates, whether effected in the manner set forth, or in any other that is substantially the same.

In describing this wheel, I have supposed the shaft to be placed vertically; but this position may be varied at pleasure, without in any respect changing the principle upon which it operates.

T. R. TIMBY.

No. 3764.

What I claim in the above machine, and desire to secure by letters patent, is the combination of the rockers and dashers in the double-chambered churn, constructed and operating in the manner and for the purpose herein set forth.

A. C. STILES.

No. 3765.

Having thus fully described the construction of my apparatus, and the system of telegraphing thereby, what I claim therein as my invention, and desire to secure by letters patent, is—

First: The combination and arrangement of single disks or lanterns, in the manner and for the purpose substantially as herein set forth.

Secondly: I claim the method of signaling the alphabet, as herein set forth, so as only to use one sign for each letter of the alphabet, by means of a decimal progression.

Thirdly: I claim the system of flags above specified—that is to say: the combination of numeral and decimal or denominator flags, combined and applied in the manner set forth.

HENRY J. ROGERS.

No. 3766.

What I claim, and desire to secure by letters patent, is an improvement consisting of a new combination of ring, hole, and hook adjusted to the

plate of the ring flyer, and in combination with each other; the ring, hole, and hook forming, by the peculiar construction and adjustment of each, and by their combination, as in the specifications, an improvement of the ring flyer, and which is called the "universal ring flyer;" the ring being such as may be formed of polished wire, as well as of the old material, and may be adjusted to the plate by forcing it in, as stated in the specification; the hole (which may be also called a notch or indentation) so shaped and formed as that it enters both into the upper surface of the plate, and into the outer surface of the ring, taking a direction towards the centre of the ring and towards the centre of the wire or other circular material of the ring, and deep and large enough to admit freely the largest curved end of the hook far enough into it to allow the other end of the hook to be carried over, and hang freely within and below the ring, and so situated, in respect to the ring and plate, as to remain always open and ready to receive the hook without impeding the revolving thereof, and formed and adjusted as stated in the specification; the hook being formed and shaped as in the specification and drawing described, and so adjusted to the ring by means of the hole, as aforesaid, that it hangs perpendicularly and loosely upon the ring, with one of its curved ends remaining above and upon the ring, and the other below the ring, and travels freely, without interruption, from the open hole. These parts in this combination, and the peculiar construction, adjustment, and adaptation of each of the said parts in itself and to each other, whereby the combination is produced, and is put in operation, as set forth in the specifications and drawings, I claim as my improvement and invention.

JOHN THORP.

No. 3767.

What I claim as my invention, and desire to secure by letters patent, is the addition of the hook T, extending above the edges of the rings of the grinder, and presenting their points forward in the direction of the motion of the grinder—the whole being arranged, constructed, and combined, substantially as hereinbefore described.

MATHER BEECHER.

No. 3768.

Having thus fully described the manner in which I construct my brick press, and shown the operation thereof, what I claim therein as new, and desire to secure by letters patent, is the manner of condensing the pulverized earth or clay, by forcing it, by means of a piston, through a channel like that which I have denominated the moulding trunk; which trunk may be made to vary in the dimensions of its respective parts, in the manner herein set forth, or may be of the same dimensions throughout, but of increased length—it being so made, in either case, as that the friction of the clay against the sides of the channel, along which it must pass, shall suffice to cause the material to be sufficiently condensed to give the required solidity to the brick.

I likewise claim the cutting off and paring the sides of the brick by means of knives, arranged and operating substantially as herein set forth.

I also claim the particular manner of constructing the pulverizer, by combining a revolving disk, furnished with teeth on each of its faces, with the guard bars *b*, *b*, and the checks *c*, *c*, as set forth.

NATHAN SAWYER.

No. 3769.

Having thus explained the nature and principles of my invention, that which I claim therein is as follows, viz : I claim my particular mode of arranging and operating the bed, (with or without its form of type,) platen, frisket frame, (with or without its frisket,) and inking apparatus, with respect to each other ; not meaning in the above to claim the mechanical devices *adopted* to produce their respective movements, but the manner in which they are all arranged and operate *together*, or in *combination* with each other ; the said arrangement and operation of the parts consisting— 1st, in placing the platen in line between the bed and frisket frame, (when the frisket frame is out, or in position to receive a sheet of paper to be printed,) and somewhat above the same ; 2d, in causing the bed and frisket frame to be moved towards each other and the platen, and beneath the platen, and so as to carry the frisket (containing the sheet of paper) directly under the platen, and over the form of type on the bed ; and, after imprinting the sheet of paper, reversing the movements of the bed and frisket frame, so as to cause them to recede from each other and the platen, and to come into their first position, viz : such a position as will enable the operative or operatives of the press to remove the *printed* sheet of paper, and supply its place with one to be printed ; and, 3d, in disposing the inking apparatus directly in rear of, or upon the rear part of the platen, and so that, as the bed passes out from beneath the platen, and in or below the same, the said inking apparatus shall ink the form of type, as hereinbefore set forth. I also claim the combination of levers, connecting rods, and links, in their application to the bed and frisket frame, in the manner as set forth, and for the purpose of producing the required movements of the frisket frame through those of the bed.

I also claim the manner by which I am enabled to produce the reciprocating rectilinear lateral movements of the distributors x, x, x, upon the roller V beneath them, without using any apparatus such as is generally applied to the said lateral distributors, for changing their angular positions with respect to the roller beneath them, so as to cause them to travel upon it, from one end of it to the other end, in an opposite direction, viz : by arranging the main distributing rollers with respect to the roller by which the type is inked, and the said inking roller with respect to the bed, as described ; the peculiar back-and-forth motions of the lateral distributors from end to end of the roller V being in this manner obtained from the inking roller—which has never been so effected in any printing machine which has ever come to my knowledge.

SETH ADAMS.

No. 3770.

I do not claim the use of cams for operating the pistons in pressing brick, nor do I claim the manner in which the bricks are received, compressed, and delivered ; but what I do claim as my invention, and which I desire to secure by letters patent, is the arrangement of the two cams c^1, c^2, for effecting the pressure and delivery of the bricks, in combination with the pistons D^1, D^2, and movable mould F. I also claim the combination of the rollers M, M, and pins N, P, for pulverizing the clay, as above described.

B. H. BROWN.

No. 3771.

What we claim as our invention, and desire to secure by letters patent, is the hand press constructed as herein described, and, in combination therewith, type formed of an elastics ubstance, composed of glue and molasses, or other material when deemed necessary; to be used by means of said presses with the aid of springs or other similar means, and other fixtures, as herein described, so as to insure the successful application of the type to even or uneven surfaces, using for that purpose any material or compound that will produce the intended effect.

WILLIAM FRANCIS.
WILLIAM JOHNSTON.

No. 3772.

Therefore, my invention, and that which I claim as an improvement, consists in the employment, in the manner set forth, of a cylinder, or other proper shaped vessel, B, capable of receiving and holding a mass of sugar, or other material, and whose sides are composed of a porous material of such strength and character as will retain the mass of sugar or other substance to be operated on, and at the same time permit the passage of the liquid matters (proceeding from the mass) through them, when the said vessel is put in such rapid revolution as to generate in the liquid or liquids a sufficient degree of centrifugal force to expel it or them from the mass as described. And in combination with a vessel so arranged and operated, I claim the cistern A, wholly or partially surrounding the same, or so connected with the same as to catch and retain, or suffer to escape into a proper receptacle, the liquid matters as they are expelled from the mass in the vessel B; and I further claim the combination with the vessel B, of a means of supplying water or other cleansing liquid to the central or other suitable part of the mass of sugar, or other material to be cleansed, for the purpose of dressing or cleansing, &c., as set forth. Also, the manner of dressing or cleansing sugar, or other matters susceptible of being so dressed or cleansed, viz: by passing a current of water, or other suitable cleansing liquid, into the interior of the mass, and from thence driving it through and out of the mass by centrifugal force, substantially as explained.

JOSEPH HURD.

No. 3773.

I do not claim the combining with phosphorus, or other inflammable substance, an earthy incombustible material mixed with it, or made by means of a glutinous substance (such as glue or gum arabic) to adhere to and surround and protect it from oxidation, or the absorption of moisture; neither do I claim the employment of glue, or a gelatinous liquid or substance, for the purpose of cementing the phosphorus and protecting material together; because I believe that such earthy and gelatinous materials, whether together or separate from each other, have long been employed both in this and foreign countries for such purpose. But that which I do claim consists in the employment, in the manufacture of friction matches, of *combustible* materials, such as pulverized dried bark, wood, or other *vegetable* matters substantially the same in character, instead of mineral and other substan-

ces, for the purpose of protecting the phosphorus or inflammable substance, and for giving consistency or body to the paste, as above set forth. And, particularly, I claim the using of vegetable matters (such as hemlock bark, oak bark, sumach, nut galls, &c.) containing more or less tannin, and which, when combined with the glue or gelatinous adhesive mixture, form "*tanno gelatin*," or an insoluble substance, which, although almost if not entirely proof against the absorption of moisture, will readily be consumed by fire—the whole being substantially as hereinbefore explained.

ELISHA SMITH.

No. 3774.

What I claim as my invention, and desire to secure by letters patent, is the uniting of two helical springs, in the manner described, for the purpose of distending the air bag of a life preserver, essentially in the manner described herein.

ADONIRAM CHANDLER.

No. 3775.

Having thus described the manner in which I construct my machine for cutting and crushing corn fodder, and shown the operation thereof, what I claim therein as new, and desire to secure by letters patent, is the manner in which I have arranged and combined the cutting and the crushing, or rubbing apparatus, substantially as set forth.

RUDOLPH MILLER.

No. 3776.

What I claim as my invention, and which I desire to secure by letters patent, is the combination of the racks *b*, bars *c*, screw *g*, and hooks *h*, for holding the portable frame A, containing the boring tool firmly down upon the article to be bored, in the manner set forth, for boring holes at any required angle with facility and accuracy.

THOMAS J. RUSSELL.

No. 3777.

I do not claim as my invention the coulter connected with the hook; but what I do claim as my invention, and desire to secure by letters patent, is the "gathering hook" H, as described and contemplated in this specification applied to ploughs for gathering in grain, grass, weeds, &c., to turn them under the sod in ploughing.

DUDLEY HILLS.

No. 3778.

What I claim as my invention, and which I desire to secure by letters patent, is the combination and arrangement of the springs and rods with the sacking bottom and rails, as before described.

ISAAC COOPER.

No. 3779.

What I claim as my invention, and desire to secure by letters patent, is the construction of the pommel, by the union of two pieces for the formation of the arch of the pommel, and the construction of the cantle by the union of two pieces for the formation of the arch of the cantle; and the combination of the several constituent parts of the saddle-tree in union with each other, in the manner described in the foregoing specification.

I claim, also, the combination of the parts A A, B B, C C, D D, and V, of the saddle-tree, in the manner substantially the same as set forth—that is, in such manner as to give to the rider the position and ease as herein set forth; the same giving comfort to the horse, and to the saddle a marked character, by which this saddle may be easily distinguished from all others known.

SAMUEL RINGGOLD,
Major United States Army.

No. 3780.

Having thus fully described my invention, I proceed to point out those parts which I deem novel and of new effect. What I claim as new, and desire to secure by letters patent, is the application of flexible ivory, substantially in the modes and for the use and purposes set forth.

E. DUPUY.

No. 3781.

What I claim as my invention, and which I wish to secure by letters patent, consists in the combination of the rings A, B, with the tube C, in the manner and for the purpose above described.

CHRISTOPHER WEST.

No. 3782.

What we do claim in the above-described machine, and desire to secure by letters patent, is the use of a series of circular knives running with great speed in water, in connexion with a small grooved roller, each knife working without friction in its separate groove, both turning in the same direction, but with unequal speed—say the knives to the rollers as 100 to 1.

We also claim and desire to secure the use, in connexion with this machine, of another small and smooth roller, for the purpose of pressing the sheet in its passage evenly and uniformly on the grooved roller, thereby preventing the clogging of the material, and without which the machine would not be so efficient in action; whereby we cut and divide a sheet of rubber of any desirable length into separate threads perfectly and effectually, without injury to the strength and elasticity of the material; the whole operating substantially as above set forth.

HENRY GEORGE TYER.
JOHN HELM.

No. 3783.

What I claim as my invention, and desire to secure by letters patent, is

the stud (d d) figure 1, with the slit to guide the knife perpendicularly, the brace (f) as applied to the knife B, to give the drawing stroke or cut, and the slit in the end of the knife at m, as seen in the drawing.

FRANLIN ROYS.

No. 3784.

Having thus fully described the nature of the apparatus which I use, and of the process which I follow, for the rendering of concrete fatty substances I do hereby declare that I do not make any claim to the rendering of such substances by the introduction of steam into open vessels, in which they are contained—this having been previously done; but what I do claim as constituting my improvement, and desire to secure by letters patent, is the manner set forth of arranging and combining the respective parts of such a vessel: that is to say, I claim in combination the vertical tank A, A, perforated false bottom D, and discharging hole E—such hole having a cover F, to be operated upon in the manner and for the purpose set forth; the said tank being also furnished with a series of cocks P, P, guarded on the interior by a strainer Q; the whole being so formed and arranged as to attain the proposed end, by means substantially the same with that herein fully made known.

EBENEZER WILSON.

No. 3785.

What I claim as my invention, and desire to secure by letters patent, is arranging the combs, pins, card teeth, or brushes, in rows, radiating from a common centre, and parallel (or nearly so) with the face of a wheel, when attached to the wheel, or to arms projecting from a wheel, or to a plane corresponding to the face of a wheel when they are attached to arms simply projecting from a shaft, as herein described. And the employment of comb, brush, &c., thus constructed, in combination with combs on another wheel, for the purpose and in the manner substantially as described.

EZRA GOULD.

No. 3786.

Having thus fully described my improvements, what I claim therein, and what I desire to secure by letters patent, is the before-described mode of employing the cylindrical tube N, for the double purpose of a coupling box and a stuffing box, by combining it with the coupled shaft and with the other portions of the stuffing box; by which arrangement much room is saved, and great simplicity attained—all as herein described.

R. F. LOPER.

No. 3787.

What I claim as my invention, and desire to secure by letters patent, is the method of moving the slides of the head and tail blocks simultaneously as the carriage is gigged back by means of the toggle joints, combined with the slides to which the log is dogged, and the drivers L, for operating the toggle joints in the manner and operated in the way above described fo

setting both ends of the log simultaneously, whilst the saw is in the groove of the head block.

JOHN B. SQUIER.

No. 3788.

I do not intend to confine myself to any particular number of ruddles, combs, or friction rollers, intending to use as many such as may be necessary to do the work in the most advantageous way. Nor do I limit my claim to any particular contrivance by which to produce unequal speed between the friction and compressing rollers, using any such as will answer the purpose.

I do not claim the invention of compressing or calender rollers, or the gearing with which they are driven; the same having been in common use in the manufacture of India rubber, and for other purposes. I do not claim the rollers on which the cloth which is to cover the threads is beamed up or rolled, the same having been in common use in India-rubber and other factories. Nor do I claim the drums, or cog wheels, or level wheels, as new in themselves. I do not claim that part of the side frame in immediate contact with the table, and in which the compressing rollers revolve—such part being in common use in India-rubber and other factories. What I now do claim as my invention, and desire to secure by letters patent in the above-described machine, is the combining with two compressing rollers C, C, one or more friction drums or rollers, covered with suitable friction material, and combining with these the roller M, together with the spool F, an elastic band or apron to which the threads of India-rubber are attached. The whole being connected and working together in manner substantially as above set forth and made known.

HORACE H. DAY.

No. 3789.

What I claim as my invention, and desire to secure by letters patent, is the combination of the circular and angular knives, as described; and also, in combination with the same, the scrapers K K, operating in the manner and for the purposes above set forth.

ZABINA ELLIS.

No. 3790.

Having thus fully described the nature of the machinery used by me for forming hats and caps of leather, skins, or other fabric, and shown the manner in which the same operates, I do hereby declare that I do not claim either of the parts taken individually; but what I do claim as my invention, and desire to secure by letters patent, is making the spring clamp band conical, that the hat may be sized whilst the band is on; and I also claim this band provided with a screw, or other adjustable clamp, in combination with the bed provided with a groove in which the band lies, and from which it can be withdrawn with the hat whilst clamped around it, as described.

I also claim the combination of the hoop with the adjustable band for clamping the brim of the hat, to hold it whilst under the operation of the

machine, and after it has been removed to admit of sizing, which could not be effected with clamp plates.

RANDAL FISH.

No. 3791.

I am aware that a shaving or sliding cut has been given to the knife, by attaching each end to a connecting pendulous arm, in the manner of a parallel rule; and therefore I wish it to be understood that I do not claim this as my invention. But what I do claim as my invention, and desire to secure by letters patent, is the arrangement of the hand lever in combination with the knife, so arranged as to give a parallel sliding or shaving cut, and with the apparatus for feeding the straw, one arm of the hand lever constituting one of the parallel or pendulous arms of the knife, and another arm being provided with a segment mitre wheel to operate the feeding apparatus, as herein described.

E. TAYLOR.

No. 3792.

I do not claim to have invented any of the parts herein shown, when taken by themselves; but what I do claim, and desire to secure by letters patent, is the making an article similar to a bureau or other piece of furniture, in the interior appearance, and fitting the same to open in the parts *b*, *g*, *h*, *i*, and *d*, and legs 1 and 2, so as to attain the means of converting the article into a compact bedstead with great convenience, and at a moderate cost, with the several parts constructed and operating substantially as shown and described herein.

In witness whereof, I have hereunto set my hand, in the city of New York, this fourth day of September, one thousand eight hundred and forty-four.

HENRY W. KINGMAM.

No. 3793.

Having thus fully described the nature of my improvements in the lamp for burning volatile ingredients, what I claim therein as new, and desire to secure by letters patent, is the manner of regulating the supply by the combined operation of the filling with cotton cloth, or other similar fibrous substance, in the parts designated, together with the packing of wire interposed as at B, and the termination of the supply opening in a cylindrical stopper of straight wire immediately below the burner, as described. I claim, likewise, the employment of the groove E in the burner, made in the manner and for the purpose set forth. I do not claim either of the individual parts of the packing embraced in the first claim, but limit my claim to their combination with each other, substantially as set forth.

ISAIAH JENNINGS.

No. 3794.

What I claim as my invention, and desire to secure by letters patent, is the mode here described, of agitating the sieves by the use of the lever S, and the hopper bottom by the use of the lever F—both being attached to

and moved by the crank C, figure 2; the upper sieve partaking of the rotary motion of the crank, and the lower sieve having a horizontal motion only; the whole being so arranged as to expose the falling grain or seed to a current of air, from the time it falls from the hopper till it reaches the screen.

CALVIN O. GUERNSEY.

No. 3795.

The upper or top piece I do not claim, nor the middle or centre piece, horizontally elastic, nor the brace marked F, with said horizontally elastic bottom piece C, and said middle piece A, elastic up and down the back, and said elastic braces operating as aforesaid, whether the supporter be made of India-rubber cloth or any other material.

LYMAN WHITON.

No. 3796.

Having thus fully described my inventions, and explained the operations of the various parts thereof, what I claim as new therein, and desire to secure by letters patent, is the combination and arrangement of the air, water, and steam chambers of my improved combined heater, in such a manner that the waste steam from a steam engine shall heat the supply water while passing through the heater on its way to the boiler furnishing said engine with steam; and the air required for combustion in the furnace of said boiler, in its passage through another portion of my improved combined heater, as herein described.

ZENAS C. ROBBINS.

No. 3797.

Having thus fully described the nature of my improvements on the machine for sweeping streets, what I claim therein as new, and desire to secure by letters patent, is the manner in which I have formed and arranged the brooms, and combined them with the other parts of the apparatus, their stocks or heads being curved in the manner set forth, and the system of brooms being made to revolve horizontally, and to deposite the dirt in regular rows, by raising them in a part of their circuit, as described; the general arrangement and operation of the respective parts of the machine being substantially the same with that herein fully made known.

ALEX. M. WILSON.

No. 3798.

Having now described the invention, and the manner of carrying the same into effect, it is scarcely necessary to point out to any one acquainted with the construction of machines, that the form and construction of this machine admits of considerable variation, and many of the operations may be performed by other mechanical devices. I therefore do not confine myself to the precise arrangements and construction of parts herein shown, nor do I claim the exclusive use of the several parts, except as hereinafter

mentioned, unless the said several parts be used in the construction and working of a machine, as hereinbefore described, for producing knitted work or fabrics. But I do claim, 1stly, arranging the hook-billed needles, such as are used in the formation of stocking net, and all other fabrics netted radially around a circular plate, or disk, or ring, as herein described; 2dly, I claim the sinkers in combination with the comb plate, provided with radial slots through which the sinks pass, and by which they are guided, as herein described; 3dly, I claim the disk in combination with the needles for closing the beaks of the needles preparatory to casting off the old loops over the points of the needles, as described; 4thly, I claim the arrangement of the cam pieces *m m* and *n n*, to throw out the sinkers; and, in combination with these, I claim the pressing pieces and helical springs for forcing back the sinkers, as herein described; 5thly, I claim the method of working the sinkers up and down in the circle, by means of the undulating rib or rail in combination with the sinkers; 6thly, I also claim the combination together of all the elements enumerated in the foregoing claims, whereby I am enabled to knit continuously around a circle, as described.

P. E. LADRANGE.

No. 3799.

Having thus fully described the manner in which I construct and operate my balloon or äerostat, I will remark, that I am aware that inclined planes have been applied to äerial machines for the purpose of enabling them to ascend by the resistance of the air; it having been attempted to propel such machines by flapping instruments called wings, by revolving screws, by paddles, and by other similar means. I am also aware that machines thus attempted to be propelled have been furnished with jointed inclined planes, for the purpose of guiding them, in the manner of the tail of a bird. It is to be understood, therefore, that I do not claim as of my invention the mere application of inclined planes for the decomposition or resolution of the ascending and descending forces. But what I do claim as of my invention, and desire to secure by letters patent, is the combination of inclined planes, substantially as herein described, with an äerial machine or balloon, which is made to ascend and descend by a change in its specific gravity, as set forth; the ascending and descending forces decomposed or neutralized, and resolved into a horizontal one, or rather into a progressive line more or less inclined to the horizon, by the aid of atmospheric resistance; whereby the whole machine is impelled forward, and the direction changed at pleasure, by altering the inclination of the planes; the same being effected substantially as herein described. But it is to be distinctly understood that I do not limit my claim to the number or to the form of the inclined planes, or to the particular manner of operating them, or to the manner of obtaining an ascending and descending force, so long as the same is effected by a change of the specific gravity of the balloon, which, it will be evident, may be effected by the generation of hydrogen, as well as by its discharge.

MUZIO MUZZI.

No. 3800.

I do not claim the employment of a metallic or flexible tube in the opera-

tions necessary in uterine affections ; but what I do claim, is my improved instrument, having a knob (*b*) at one end, and an expanded mouth piece (*d*) at the other, or being constructed without the said mouth piece, but in other respects substantially as described—the same being for the purposes as hereinbefore specified.

DANIEL GALE.

No. 3801.

What I claim as my invention and improvement, and desire to secure by letters patent, is giving to the bobbins the required rotary and traversing motion herein described, by causing them to rest on the peripheries of wheels arranged on a horizontal traversing shaft, whether applied to the cap frame, live spindle throttle, or other modes of spinning substantially the same, in which the bobbins receive rotating and traversing motions.

FRANCIS McCULLY, Jr.

No. 3802.

What I claim therein as new, and desire to secure by letters patent, is—1st. My improvement in the periods of the movements of the valves, by which they are opened and closed relatively to each other, and to the movement of the piston ; by means of which, the piston completes each stroke in equilibrio, or nearly so, without admitting steam against the movement of the piston, by a lead to the steam valve, which is effected, as before stated, by opening the lower exhaust valve before the end of the upward stroke of the piston, and before the upper exhaust valve is closed, and opening the upper exhaust valve before the end of the downward stroke of the piston, and before the lower exhaust-valve is closed ; the movement of the steam valves being so regulated as to admit steam to the cylinder only after the exhaust valve on the corresponding end of the cylinder has been closed.

I also claim as my next improvement, and as a means of carrying into effect my first and essential improvement, the arrangement of the toes on the rock shaft, in such manner relatively to the location and form of the feet on the lifting rods, that at the middle, or nearly so, of the rocking motion of the rock shaft, both lifting rods, with their exhaust valves, shall be partly up, as herein described ; and I also claim, in combination with this arrangement, the slip of the lifters on the steam-valve stems, as described, to insure the closing of the exhaust valves before the opening of the steam valves on the corresponding ends of the cylinder, as herein described.

FREDERICK ELLSWORTH SICKELS.

No. 3803.

What I claim as my invention, and desire to secure by letters patent, is the mode of adapting the machine to different and varying heights of grain, by the combination of the adjustable boxes which connect the axle of the wheels with the receiver to which the cutters and reel are attached, in combination with the lever that connects the receiver with the horse frame, as described.

I also claim as my invention, and desire to secure by letters patent, making the reel in two independent parts, the shaft of one passing through

the shaft of the other, so that they can turn with velocities corresponding with the velocities of the main wheels in turning curves of various degrees, as described, and removing the strain from the axle of the reel, cutters, and propelling gear, as herein set forth.

GEORGE ESTERLY.

No. 3804.

Having thus described my invention, what I claim therein, and desire to secure by letters patent, is the combination of the cylinder *a* and buckets *b*, constructed and arranged in the manner and for the purpose above described.

J. D. ROBINSON.

No. 3805.

What I claim as my invention, and desire to secure by letters patent, is arranging the pattern on one set of arms of a tilting or vibrating frame, and the article to be turned or formed on another set, vibrating on the same centre, and with them, as herein described; the gearing for communicating motion to the pattern and mandrel being arranged at one end of the tilting or vibrating frame, substantially as herein described. I also claim arranging the smoothing wheel *t*, and small pattern or guide wheel *u*, on different sets of arms vibrating together, and on the same centre, attached to the frame of, and travelling with, the reducing and main pattern wheels, as described; and this arrangement of the small smoothing and pattern wheels I claim, in combination of the pattern and article to be formed, as above described.

EDWIN TUCKER.

No. 3806.

We do not claim the use of a compensation bar regulating the heat of stoves; but what we do claim is the manner herein described, of combining with our stove, or any other substantially the same in principle, the compensating bar; the construction and arrangement being substantially the same as herein set forth.

We also claim the manner of closing the draught by means of the combination of the ash-box, sand-lute, and inclined planes, in the manner herein set forth.

JOSEPH SEXTON,
GEORGE ELLIOT.

No. 3807.

I do not claim an extra stove or fire chamber, nor the construction of my main stove; but what I do claim as my invention, and desire to secure by letters patent, is the manner in which I have combined the extra fire box D with the main stove; that is, there being between the fire box and the oven B three division plates, or two flue spaces, for the purpose above described—the main stove being constructed substantially as described, viz: having a fire chamber above the oven, and the flues and dampers arranged and operating as set forth.

J. W. RIGGS.

No. 3808.

I do not claim as my invention the combination of the right-angle lever with its jointed arm, and the trip lever operated by the inclined bar to set the log, as this has been applied to set the tail end of the log, the levers being brought back to their appropriate position for a repetition of this action by a spring; but what I do claim as my invention, and desire to secure by letters patent, is reversing this arrangement in combination with the head block for a saw-mill carriage, so that the lever is brought back for a repetition of the action by the inclined bar, and the log is set by the spring the moment the lever is relieved from the inclined bar. I also claim the combination of the cog wheel, ratchet wheel, drum and axle operated by the rack on the side of the carriage, with the dogs, springs, cords, weights, pole and bar for opening and shutting the water gate, in the manner and for the purpose set forth.

N. P. STEARNS.

No. 3809.

What I claim as my invention, and desire to secure by letters patent, is the method herein described of making and forming bonnet frames of steel or iron wire, case hardened, and so constructing it as to be purely elastic, so that when bent up to the shape of the bonnet, or flattened out, it retains its tension; also, in hanging the crown by a small hinge to the back of the elastic frame; all of which is described in the annexed specification, and also shown in drawings figs. 1 and 2.

THOMAS HAMMOND.

No. 3810.

I do not claim the mode described of flexing and extending the frame work; nor do I claim the mode of extending or shortening the splints as described. But what I do claim is the combination of the splints (whether adjustable or not) with the hinged bar or frame work; said bar being extended and flexed in substantially the manner described, and said splints being independent of the bar, and so constructed as to be readily attached or detached at pleasure, for the purpose herein described; the whole construction being substantially as herein set forth. I have applied the same principles of construction to the upper extremities, the modifications being only in form to suit the shape and motions of the upper limbs.

LIVINGSTON ROE.

No. 3811.

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, is the adjustable whetstone so arranged and combined as that it shall meet in its ascending angular motion the edge of the knife in its descending angular motion, thereby setting the edge in towards the straw-rest, and giving the edge of the knife an appearance much like that of the sickle.

E. TAYLOR.

No. 3812.

I do not confine myself to any particular metal, as a variety may be used, and the truss would still be effective. I do not claim as my invention the several parts marked 1, 2, 3, 4, 5, 6, 7, 8, or the arrangement. But what I do claim as my invention, and desire to secure by letters patent, is the use of a continuous metallic band entirely encircling the body, and fastening in itself, and of such material as not to stretch by use, but of such malleability as to allow any person to shape it to themselves at pleasure ; thereby doing away with the use of leather or other straps of stretching material.

E. C. DARLING.

No. 3813.

Having thus fully described my improvements, and the operation of the same, what I claim therein as new, and desire to secure by letters patent, is the combination of the balance or steelyard with the lifting crane, substantially in the manner and for the purpose herein set forth.

L. HENRY.

No. 3814.

What we claim as our invention and improvement, and desire to secure by letters patent, is the use of said hollow metallic teeth and hollow metallic parts of teeth ; the metal being less liable than wood to relax and straighten.

WILLIAM A. WOOD.
JOHN C. LOVELAND.

No. 3815.

What I claim as my invention, and desire to secure by letters patent, is—1st. The combination of the inclined parallel levers R, R, with the horizontal carriage R^z and rollers S^z, arranged and operated in the manner and for the purpose above set forth. 2d. The arrangement of the ends *d* of the box grooves in the platen, so as to rise and fall with the platen, and be liberated from it at the termination of the pressing. 3d. The combination of the levers Z with the platen, arranged and operated in the manner and for the purpose above set forth. 4th. The manner of disengaging the bars from the box, by means of the pins *p* upon the ascending ends of the box, in order to throw open the sides of the box, to tie and remove the bale.

JEDEDIAH PRESCOTT.

No. 3816.

First. I claim as new, and of my invention, and desire to secure by letters patent, the mode described of fitting the tide gate I, at one end of a race way, formed by an inner and outer dam wall, in combination with an outer current gate K, and an inner current gate L, at the opposite end of the race way ; the whole constructed and operating substantially as herein described.

Second. I claim the mode of forming the dam walls with pits, open at the bottom, to receive and float the caissons that carry the water wheel ;

and the combination therewith of the described means for regulating, adjusting, and directing the ascent and descent of the wheel or wheels, substantially as the same are described and shown herein.

Third. I claim the combination of the described mode of fitting the gates and wheel, or wheels, and making them act together in the manner described herein.

In witness whereof, I have hereunto set my hand, in the city of New York, this twentieth day of June, in the year one thousand eight hundred and forty-four.

ISHAM GERARD ROSS.

No. 3817.

Having thus fully described my improvements, what I claim therein as my invention, is, first, the regulating reservoir or spout (*d*,) constructed as above described, in combination with the cylinder and concave, as herein specified.

JACOB GROAT.

No. 3818.

What I claim as my invention, and desire to secure by letters patent, is the combination of a bulk of square logs, resembling the hull of a vessel, the adjustable breakers B, and the rake F, with its oscillating cylinder G, and windlass E ; the whole forming an apparatus for removing sand or mud bars or shoals, or other similar obstructions to navigation, from the beds of rivers and other waters ; said apparatus being (substantially) constructed, and operates as herein above described.

DENNIS VERMILLION.

No. 3819.

Having thus fully described my improvement, I wish it to be understood that I do not claim a self-sharpening cultivator tooth, as that is known ; but what I do claim as my invention, and desire to secure by letters patent, is the self-sharpening convex cutter, constructed substantially as herein set forth, in combination with the cultivator tooth, in the manner and for the purpose described.

JAMES BIRDSELL.

No. 3820.

What I claim as my invention, and desire to secure by letters patent, are the jointed protractor A, and the straps or measures G and D, attached with screw and eyelet holes, as before described ; by means of which all the angles necessary to be had, in order to insure a perfect fit, are easily and accurately obtained.

JOHN P. COMBS.

No. 3821.

I do not claim expanding the flue above the throat ; but what I do claim

as my invention, and which I desire to secure by letters patent, is dropping the back of the fireplace below the arch, in the manner described and represented, in combination with the expanding flue, substantially in the manner set forth.

DANIEL HEMINGWAY.

No. 3822.

Having thus fully described the nature of my improvement in the horizontal wind wheel, what I claim therein as new, and desire to secure by letters patent, is the manner herein set forth, of combining the motion of two opposite vanes by means of cords, chains, or rods, by which they are connected to the end of a vibrating beam, substantially in the manner and for the purpose herein made known.

DANIEL DENNETT.

No. 3823.

What I claim as my invention, and desire to secure by letters patent, is 1st. The throwing the straw by means of the arms V, W. 2d. The lifting the straw by means of the arms X and Y, to let the other pass. 3d. The combination of the forceps Z with the arms V, W, and X, Y, to hold the straws. 4th. The moving forceps at each throw of the arms V and W, preparatory to their transfer. 5th. Folding the straw over the hooks, in the manner and for the purpose described. 6th. The beater for tightening the braid, in combination with the eye plate in which the braid is formed. 7th. The knife Y, for cutting off the straw, in combination with the eye plate, in which the braid is formed. 8th. Transferring the forceps from the feeding apparatus to the braiding apparatus, and *vice versa*, in the manner described. 9th. The attaching segments of the channel in which the forceps travel or move to the ends of the arms X, and Y, and V, and W, for holding and transferring the forceps, (see 33½ and 33¾ for channel.) 10th. The apparatus for separating a straw from the quantity in the box (*m*,) consisting of the piece (*k*, *k*,) having a groove in its end operated on by the uneven under surface of the bed (*r*,) in combination with the feeding plate having a channel across it. 11th. The apparatus for stopping the braiding operation a moment while the feeding takes place; said apparatus consisting of the combination of the stopping cam (*b*, *d*,) with the wheels H and I, and the differential pinion J, connected in the manner described. 12th. The combination of the pinion and driver, or clutch M or N, and A *u*, with the vibrating disk A, W, and its apparatus of catch-heads A, V, and stops (*b*, *d*,) to produce the kind of alternate motion above described. 13th. The combination of the finger (*a*) on the shaft B *u*, with the heads of the forceps for moving them. 14th. The combination of the two rollers B *m*, and B *n* with the knife Y, for removing the straw. 15th. The peculiar shape of the arm W, (see fig. 6½ for the shape,) to wit: the bend by which it permits the forceps in the feeding wheel (*n*) to pass.

Given under my hand, this 16th day of October, 1844.

ELISHA FITZGERALD.

No. 3824.

What I claim as my invention and improvement, and desire to secure

by letters patent, is the mode herein described of burning lampblack—that is to say, burning it in a confined building or room without a chimney or draught, substantially in the manner set forth in the above specification.

G. MINI.

No. 3825.

What I claim as my invention, and desire to secure by letters patent, is the manner in which I construct my point for manifold writing, by combining with the conical spiral wire point the check point (*b*) in the manner described, and attaching them to a handle for the purpose described.

JESSE R. PARK.

No. 3826.

I do not claim admitting the external air for the purpose of preventing chimneys from smoking, as that has been done before; but what I do claim is the mode herein described of introducing the air—that is to say, between the mantel and the arch, in the manner and for the purpose described.

JOSEPH GILBERT.

No. 3827.

Having thus fully described my process of manufacturing lard, &c., what I claim therein as new, and desire to secure by letters patent, is the process herein described of obtaining fat from the fibrin, &c., before it is cooked, and afterwards cooking the expressed fat in the manner described; by which the danger of injury to the lard, by cooking it with its impurities, is obviated, and a much purer article obtained, as well as a saving effected.

H. A. AMELUNG.

No. 3828.

What I claim is the combination of the vibrating grooved cylinder with the vibrating slide or platform, and also, in combination with the vibrating cylinder, the brush, as described; said parts being arranged and operated substantially in the manner set forth.

EZRA FISK.

No. 3829.

Having thus fully described the construction and operation of my improved wind mill, or wheat fan, or winnowing machine, I would remark that I do not claim a spiral fan wheel, as that has been before used with winnowing machines; but what I do claim is placing upon the same shaft two spiral wheels, so arranged and combined that the air shall be drawn in at both ends of the concave cylinder which surrounds them, and contracted and forced out at the centre upon the screens, or be used for any other purpose where a strong blast of air is required, substantially in the manner herein described.

WILLIAM STANLEY.

No. 3830.

I claim as my invention an improvement of the heat of an oven during the process of baking, by combining therewith a movable * * * situated immediately above said oven.

JAMES H. LYON.

SCHENECTADY, *September* 17, 1844.

No. 3831.

Having thus described my improvement, what I claim as my invention is the combination of the driving wheels with the cutters, in the manner described, by forming internal gear on the wheels, and enclosing all the driving gear inside of them by the construction and arrangement above set forth.

I also claim the employment of an apron in combination with the cutters, for turning in the tops of the grain, as herein described.

WILLIAM F. KETCHUM

No. 3832.

What we claim as our invention, and which we desire to secure by letters patent, is the combination and arrangement of the revolving oval racks for conveying the straw, and separating the grain therefrom, operated in the manner set forth, or other mode substantially the same. We also claim the combination of the revolving endless apron with the before-described revolving oval racks, arranged in the manner and for the purpose set forth.

MANNING PACKARD.
CHRISTOPHER B. PACKARD.

No. 3833.

Having thus described the nature of these improvements, and the manner of performing the same, I would have it understood that I do not confine myself to the precise details as described, provided the general character of either part of these improvements be retained. But what I claim is—1st, the concentric and eccentric motion, in conjunction with the jointed fliers or pistons, which causes the said fliers or pistons always to point to the centre of cylinder, and keep the same radius as the cylinder. The excentric motion alone would not carry out the fliers or pistons to form a true circle, if not in conjunction with the principle of jointed fliers.

2d. I claim the method of taking the friction from the outside of the fliers or pistons, against the sides of the cylinder, occasioned by the centrifugal force by means of "the ring or hook" which unites the fliers or pistons in manner substantially as described.

MATTHEW FLETCHER.

VIENNA, *May* 14, 1844.

No. 3834.

Having thus fully described my improvements, what I claim therein as my invention, and desire to secure by letters patent, is dividing the interior

of the furnace stack into two or more compartments, by partitions, which descend nearly to the bosh of the furnace—the bosh being the same as that of the common blast furnace, except the elevated hearth; the whole being constructed, arranged, and combined, in the manner and for the purpose herein set forth.

I also claim the hearth, (*c*,) raised above the common hearth, and with the bosh, so that the melted metal will fall below the blast, and the fuel be retained up to the blast, as set forth.

LEMAN BRADLEY.

No. 3835.

I claim the method of increasing the capacity of the press, by prolonging the upper ends of the connecting rods or levers, in connexion with the racket, as herein described and set forth.

PETER M. WRIGHT.

No. 3836.

1st. Having thus described my improvements and their operation, what I claim as my invention, and desire to secure by letters patent, is—1st. The joining the moulds in the manner described, or in any other substantially the same.

2d. I claim constructing the casting pan in the manner described, with upright tubes (plate 2) at the sides thereof, through which the metal flows into the pan; and the cover, having a cup formed on the top thereof, with holes through it into the pan; the whole being arranged in the manner and for the purpose described.

3d. I claim the combination of the moulds, the floaters, or plates between them and the pans, in the process of stereotyping, substantially in the manner and for the purpose set forth; by which any convenient number of plates can be cast at one time, without danger of breaking the moulds, or injuring the face of the letters, by *dirt*, or *dross*, or *shrinkage*.

4th. I claim the combination of the revolving and stationary cutters for reducing and levelling the back of stereotype plates, as herein made known; and in combination therewith, the springs or fingers for holding down the plates.

5th. I claim the combinations of the chisels, constructed and arranged as herein described, with the ordinary levelling machine, in the manner and for the purpose above specified.

6th. I claim, also, the revolving marginal cutters, for levelling the edges of stereotype plates, arranged and constructed in the manner set forth, in combination with the chiseling machine for finishing stereotype plates.

CLEMENT DAVISON.

No. 3837.

What I claim as my invention, and desire to secure by letters patent, is—1st. The combination of the eccentric rollers, for gauging the thickness of the shingle to be cut, with the knife gate, as herein described. 2d. In combination with the eccentric rollers on the vibrating gate, the arrangement of

cog wheels, ratchet, and levers, for rotating the eccentric rollers as described.

Given under my hand, this 19th day of September, 1844, at the city of New York.

TILLOTT COLE.

No. 3838.

I am aware that a patent has been granted for a plane, in which there is a piece of metal secured to the back part of the throat of the plane, to receive a screw, by which the bite of the bit is regulated. And I am also aware that a screw has been used for drawing cutting tools in and out, at pleasure, to regulate the degree of bite; and therefore I do not claim these devices as my invention. But what I do claim as my invention, and which I desire to secure by letters patent, is the arrangement herein described, by which the piece of metal at the back side of the throat receives the screw that secures the cap C, embracing the bit D; and, also, the set screw E, for the adjustment and moving of the bit D; by which arrangement the said bit D can be set, without moving the cap C, as described.

LEVI SANDFORD.

No. 3839.

Having thus fully made known and described the manner in which I arrange and combine the respective parts of my cylindrical mortise latch, what I claim therein as new, and desire to secure by letters patent, is the manner of retracting the bolt by means of two slides, actuated by means of a toothed pinion—said slide receiving the horns of the bolt, and constituting two racks, formed and operating substantially as set forth.

WILLIAM WILSON.

No. 3840.

What I claim as my invention, and which I desire to secure by letters patent, is the before-described combination of block or frame B, of the self-acting press, with the piston A D, card H, pulleys C, and windlass E, suspended and operating in the manner and for the purpose set forth.

JOHN MARTIN, Jr.

No. 3841.

I do not claim constructing the hive of several boxes, placed one above another, with communications between them, and each box having its separate and respective opening; nor the mode of ventilating. But what I do claim as my invention, and which I desire to secure by letters patent, is my manner (as herein described) of freeing the honey boxes from bees; and, also, of equalizing the hives by the use of the long tube, as set forth.

OLIVER REYNOLDS.

No. 3842.

Having thus fully described the nature of my improved permutation lock,

and shown the manner in which the same operates, what I claim as new therein, and desire to secure by letters patent, is the manner herein set forth, in which I have arranged and combined the hollow centres with their wheels and their other appendages, so constructed as to receive the change-pin A''' through slots, in a plate operating like No. 8; and, also, to receive a set-pin, operating like that marked *v* in the accompanying drawings; these pins, and the other parts described, being so arranged as that, by the said combination of parts, the said lock may be set by their means, and by that of the graduations on the escutcheon, and may be locked and unlocked by the application of a compound key, such as is herein described—the lock being operated upon by three sets of motions, as set forth. The combination and arrangement, as a whole, being substantially such as is herein fully made known; not intending, however, to limit myself, by this claim, to the precise number of divisions, or other parts which govern the extent of the different permutations which may be made by means of a lock constructed upon this principle, but to vary these to any extent which I may deem proper, whilst the arrangement of the instrument is such as to preserve the same principle of action and the same combination of parts.

D. W. MAPLES.

No. 3843.

We do not claim attaching or fastening the top cards to the endless chain or belt, and taking them over rollers, or any part of Cram's self-stripping carding machine. What we claim is the combination of this brush with their revolving top cards, (so as to strip them as they pass along,) attached to the endless belt or chain, thereby dispensing with their sweeps—stripping and cleaning cards and cranks. And this combination we claim as an improvement upon their machine.

HORACE BARBOUR.
JOHN GLEASON.

No. 3844.

Having thus described the nature of my invention, and the best means I am acquainted with for performing the same, I would wish it to be understood that I do not claim the apparatus herein described and shown in the annexed drawings, for forcing streams of air into and through oils and fatty matters—whether purifying, bleaching, or saponifying them—as any suitable apparatus may be employed for that purpose. But what I claim is—1st. The mode of heating, purifying, and bleaching oils and fatty matters, by causing streams of air to be forced or pressed into or through them, as herein described.

And, 2dly, I claim the mode of manufacturing soap, by causing streams of air to be passed through and amongst oils and fatty matters, when combined or together, with suitable saponifying materials.

ARTHUR DUNN.

No. 3845.

What I claim as my invention, and desire to secure by letters patent, is the manner of throwing out the front and back at the same time, by means

of levers at or in the ends of the sofa, thereby changing from bedstead to sofa, and *vice versa*, at pleasure.

Dated at Middletown, this 5th day of November, A. D. 1843.

GERARD SICKELS.

No. 3846.

What I claim is the mode herein described of constructing my vapor apparatus; that is to say, the water vessel or boiler having a top perforated with numerous small holes, and passing through it a copper coil, and combining with the same the vessel with a perforated bottom for holding the herbs for medicating the bath—the whole being constructed and operating substantially as described.

ALFORD C. HAINES, M. D.

No. 3847.

What I claim as my own invention, and for which I ask an exclusive privilege, is the combination of the fluted roller and revolving endless apron, with the box or water-tight case, for the purpose of washing clothes.

NATHAN PARISH.

No. 3848.

Having thus fully described the manner in which I construct my cooking stove, what I claim therein as new, and desire to secure by letters patent, is the particular combination and arrangement of parts by which the action and passage of heated air from the fire chamber to the exit pipe are governed, as herein described—such combination and arrangement consisting in the dividing of the upper horizontal flue above the oven into two unequal parts, (P and Q;) the part P covering the large portion of the oven—in this part being furnished with a double plate, the direct passage from the fire chamber being over it, and the compartment Q being separated from the oven by a single plate, and admitting the heated air into it through a flue opening (G) at its fore end, and along it to the exit pipe I, at its rear end; the whole combination being substantially the same with that herein set forth.

ADAM KETLER.

No. 3849.

Having thus fully described the manner in which I construct my machine for filing saws, what I claim therein as new, and desire to secure by letters patent, is the manner in which I arrange, combine, and operate the vibrating carriages, the adjustable files, and the apparatus for lifting them, in order to liberate the saw teeth from their action, as the saw is shifted. I claim the manner in which I have arranged and combined the apparatus for shifting the place of the saw, as the work proceeds—said apparatus consisting of the post R, and its appendages; the vibrating post F, and the clasps *b*, with their spring rods *a*, *a*, operating substantially as described. I claim the general arrangement of the apparatus for lifting the files directly the carriages begin to recede, as connected with the post Q, and its appen-

dages, and represented principally in figure 2. And I do hereby declare that I do not intend by these claims to limit myself to the exact form or arrangement of the respective parts and combination as herein described and represented, but to vary these as I may deem expedient; whilst such arrangement and combination are substantially the same with those herein fully made known.

CALVIN B. ROGERS.

No. 3850.

What I claim as my invention, and desire to secure by letters patent, is the application of those earths or minerals which are dissoluble or diffusible with water, and have an adhesive nature, and can be made into a paste, pap, or grout, with the above or other liquids, and can be applied as other fluxes for the reduction of ores or minerals in the blast or other furnaces. I claim the application of the above preparation, as herein described, to other minerals as well as iron, which have a similar objectional tendency, while smelting, that is found with iron. I do not claim any special right to the use of the above fluxes in a dry or natural state; it is only after they have been mixed or diffused with water or other liquids, and formed into a paste, pap, or grout, and applied as a coating or adhering substance, as herein described, that I claim as my invention or discovery, and desire to secure by letters patent.

JONAS TOWER.

No. 3851.

What I claim as my invention, and desire to secure by letters patent, is the making of hats of two distinct and seamless parts, viz: the body and the cover—the whole being manufactured in the manner and for the purpose herein above set forth.

JOHN MAGUIRE.

No. 3852.

What we claim as our invention, and desire to secure by letters patent, is the manner herein set forth of separating the grain from the straw and chaff by means of a screen constructed with parallel elastic wires fixed at one end, and free to move at their other ends, merely resting upon the frame of the screen—said screen vibrating up and down, by which means the elastic movement of the wires opens the straw, and thus gives full action to the blast.

THOMAS A. CHANDLER.
ASA D. REED.

No. 3853.

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is forcing the air into the fire chamber in the manner described, above and below the fire, in combination with the method of discharging the product of combustion, as herein set forth, from the fire chamber.

I also claim, in combination with the above, the forcing the products of combustion through a reservoir of water, substantially in the manner and for the purpose above set forth.

LEMAN BRADLEY.

No. 3854.

What I claim as my invention, and desire to secure by letters patent, is the water wheel constructed as herein described, the buckets of which are on a line exactly parallel with the shaft in their cross section, and extend into the centre with flat rings around their periphery, and without any shrouding beyond the outer rings towards the centre—the whole being arranged so that the wheel can be made to run either way, in the manner and for the purposes herein set forth, combined with the flume on each side thereof, as herein specified.

SAMUEL S. VALENTINE.

No. 3856.

Having thus explained the nature and principles of my invention, it is not my intention to claim generally the use of lateral pads, as heretofore applied, but to claim one or more lateral pads (h, h) as combined with or used in connexion with the central pad, and in front of the crest of the ilium, for the purpose of producing uniform pressure on the site of the colon and kidneys on the right side, from the capal coli, or head of the colon, to the lower rib of the same side, and upon the left side from the sigmoid flexure of the colon to the lower rib of the same side.

In testimony that the above is a correct specification of my said invention, I have hereunto set my signature, this 1st day of August, A. D. 1844.

CALVIN CUTTER.

No. 3857.

Having thus described my machine, that which I claim is as follows, viz:

I claim the above specified manner of operating the cutting knives n, s, applied upon the revolving shaft m, viz: the arranging said knives, as described, upon a revolving shaft, and causing them and the shaft to be partially revolved at suitable periods of time, in the manner as set forth, so as alternately to bring each cutting knife in succession into the required position for it to cut through the leather when depressed by the frame or mechanism by which it is made to act upon the same.

I also claim, in combination with the above, giving to the gauge plate (K) at the time of, or soon after, the depression of either knife into the leather, a motion in a direction away from the cutting knives, in order to permit the piece of leather separated from the sheet thereof to fall freely away from the same, as described.

I also claim the combination of mechanical parts by which the requisite degrees of rotary motion of the shaft which carries the cutting knives are determined in the manner hereinbefore described—the said parts being the notched circular plate x applied upon the rotary cutter shaft, the catch or latch a', the slide z, upon the circular plate, and the fixed stud, or other analogous contrivance, by which the slide is moved when the knife frame

is depressed—the whole being applied and operating substantially as described.

I also claim attaching the knife holders to the revolving shaft *m*, in such manner as to admit of a corresponding movement of their adjacent ends in transverse direction at one and the same time, and the fixing the said ends afterwards to the shaft—the same being for the purpose of narrowing or widening the toe or heel of the sole, as set forth.

In testimony that the above is a correct specification, I have hereto set my signature, this 21st day of September, A. D. 1844.

RICHARD RICHARDS.

No. 3858.

What we claim as our invention, and desire letters patent for, is the adaptation and application of the upper cylinder in straining and running of saws without a frame, and for all other purposes for which it can be used to advantage, as represented in the drawing herewith transmitted.

CALVIN STIGLEMAN.
AUSTIN SEELY.

No. 3859.

I do not claim a splint susceptible of extension, nor the use of screws for extending them ; but what I do claim is making the splints which are thus extended to constitute the double inclined plane, to be flexed and extended in the manner substantially as herein set forth.

Believing the above described splint has not been known, or used, prior to the invention of your petitioner, he therefore prays that letters patent of the United States may be granted to him therefor, vesting in him and his legal representatives the exclusive right to the same, upon the terms and conditions expressed in the act of Congress in that case made and provided—he having paid thirty dollars into the treasury, and complied with other provisions of said act.

LEWIS POST.

No. 3860.

What I claim as my invention, and which I desire to secure by letters patent, is the manner of conducting the draught by the arrangement of the flues I, J, and P, Q, in combination with the dampers U, V, and K, as set forth, causing the draught to pass twice around the oven D, as described.

ARCHIBALD WIETING.

No. 3861.

What I claim as my invention is the mode of combining my two ovens and flues, viz: the draught descending at the back of both ovens, under the lower oven, and up in front of the lower oven in one entire sheet, and dividing at the front of the upper part of the lower oven, on either side of the stove, into the two flues F^5, F^6, the draught under the upper oven being directly from the lower part of the fire chamber through the contracted flue H, in the manner and for the purpose described.

WILLIAM S. POTTER.

No. 3862.

What I claim as my invention, and desire to secure by letters patent, is the combination of the cutter H, and saws 1, 1, by which the boxes are cut out with the cutters *y*, *y*, for making the grooves to receive the lid, as described.

Given under my hand, this 27th day of November, 1844.

JOHN H. STEVENS.

No. 3863.

Having thus fully described the nature of my improvements in the machine for planing or dressing the knuckles of butt hinges, and shown the operation of the same, I do hereby declare that I do not claim to be the inventor of either of the individual parts or devices herein described, when taken separately and alone; but what I do claim as constituting my invention, and desire to secure by letters patent, is the particular manner in which I have combined and arranged these parts, so as to adapt them to the operation of planing or dressing, as set forth: that is to say, I claim the manner of forming and arranging the guide jaws, so as to press simultaneously on each side of the hinge to be planed, in combination with the follower, the bed, the planing tool, and the guide pieces which govern the hinge as it is being planed—the whole combination and arrangement being substantially the same with that herein set forth.

GAGE STICKNEY.

No. 3864.

What I claim as my invention, and which I desire to secure by letters patent, is the use of the shoe or socket point L, made as aforesaid, in combination with the before-described plough.

I do not claim an additional or false land bar, but the mode herein described, of strengthening the share by means of the extra land bar I, by which I am enabled in my plough to use wrought-iron shares.

ANTHONY TAYLOR.

No. 3865.

What I claim as my invention, and desire to secure by letters patent, is a safety turnout switch, imbodying the combined use of inclined planes and guides to elevate and slide the wheels on the tracks, and the combination of these planes and guides with the safety bars.

GUSTAVUS A. NICHOLLS.

No. 3866.

The improvements claimed, and for which letters patent are desired, are the following: 1st. The vibrating cross-head, as represented in figures 2, 3, and 6, and mode of attaching the two connecting rods R, R, thereto, so as to permit the drawing of driving wheels, to conform to the curvature of the road, without interfering with the movement of the steam pistons. 2d. The mode of maintaining or preserving the relative motion of the two sets

of drawing or driving wheels, by the combination of the horizontal slide rod D, fig. 4, the arms *h*, *h*, the crank bars K, and the cranks N′, N, on the axles of said wheels. 3d. The mode of communicating the motion from the cross-heads to the crank bars, *b*, *b*, by attaching the connecting rods R, R, to the crank bars between the crank pins; also, the mode described and represented of retaining the frustums of cones in their proper position, by means of the vertical bars I, I, and horizontal bars *a*, *a*, fig. 7. 4th. The mode of giving steadiness and support to the vibrating cross-heads H, by combining with them the eccentric cog wheels L, L, and rods *t*, *t*, as described, and the attaching of one pair of said wheels firmly to the same shaft F, fig. 2. 5th. The use and application of the rods *m*, *m*, and lever *v*′, on the two sides of the machine, as represented in fig. 1, to conform the drawing or driving wheels to the curvature of the road.

EDWIN F. JOHNSON.

MIDDLETOWN, CT., *November* 14, 1844.

No. 3867.

Having thus fully described my improvements, what I claim therein as my invention, and desire to secure by letters patent, is constructing the rubber and concave substantially in the manner set forth ; the seed being received in at the two ends, and, together with a current of air, discharged at the centre. I also claim the combination of the screens *l* and *m*, with the sieve *n*, in the shaking shoe, in the manner and for the purpose set forth, and, in combination therewith, the directing windboards, for the purpose above described.

A. B. CRAWFORD.

No. 3868.

What I claim as my invention, and desire to secure by letters patent, is the mode of feeding the nail rod or plate to the cutters, by means of a rotating hollow shaft or tube, operating substantially in the manner described, whereby the rod or plate is turned over at each operation. I claim, also, the combination of the parts which communicate the progressive feeding motion to the nippers, by the up-and-down movement of the forward end of the rotating hollow shaft or tube, as described ; and I claim the combination of parts by which the nippers are brought back, and the machine stopped. And, finally, I claim the combination of parts by which the motion is communicated from the nail machine to the rotating hollow shaft or tube.

CALEB ISBISTER.

No. 3869.

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the propeller shaft and rudder, in combination with the mode of attaching and detaching the propeller by means of a swinging or sliding frame, in the manner hereinbefore described.

J. ERICSSON.

No. 3870.

Having thus fully described our invention and its operation, what we claim therein as new, and desire to secure by letters patent, is the combination of a series of cultivator teeth, with the adjusting rollers and frame, as herein described—said teeth being jointed and adjustable, and the whole constructed and arranged substantially in the manner and for the purpose herein set forth.

WELLS KILBURNE.
FREDK. HAINES.

No. 3871.

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the band wheel within the master wheel, as described, in combination with the arrangement of the horse levers around and attached to the periphery of the main driving or master wheel—the whole being substantially as herein above described.

SAMUEL B. HAINES.

No. 3872.

What we claim as our invention, is combining the sockets and cutters for cutting the screws on the rails and in the posts, with the mandrels of a lathe for turning wood, in the manner and for the purpose substantially as described. We also claim attaching the cutters for cutting the screws on the ends of the rails to a socket, which works on a screw or mandrel, so that the length of screw is cut beyond the socket, and thus the necessity of running the threads of the socket into the threads cut is avoided, as herein fully described. And, finally, we claim attaching the *v* cutter for cutting the threads, in the post, on the outer periphery of a socket having a female screw working on a screw or mandrel, as herein described, and for the purpose fully set forth.

WILLIAM F. CONVERSE.
RICHARD H. PENNY.
RICHARD S. HANNAFORD.

No. 61—Reissue.

I claim the combination of the revolving drums and several rows of teeth, with the machinery within the said drums, for operating the several series of teeth or metallic points; the whole of the above-specified machinery being constructed and operating substantially in the manner and on the principles herein above set forth. Also, the mechanism for preventing the accumulation of knots or bunches, or defects in the roving, the same consisting of the peculiar apparatus termed the regulator, m^1, arranged so as to be moved between the drum V and the rollers a^3, b^3, and connected with the machinery for stopping the operation of the preparative or drawing drums, whenever necessary for the purposes above mentioned. Also, the

combination of the said regulator with the different series of teeth, formed as described, (those near the sides of the drums being shorter than those near the centre of the same;) which arrangement, in conjunction with the peculiar shape of the regulator, forms the roving from which thread or yarn is to be made. Also, stopping the motions of the preparative part of the machinery by means of the peculiar combination of mechanism, consisting of the regulator m^1, on the rod q^3, the shaft v^3, the bent lever t^3, on the said shaft; bent lever u^3, and clutch y^3, on the shaft P, P, as herein described. Also, I claim the employment of a single-headed screw g^2, on the spindle, and the combination of the screw g^2, the fork e^2, (attached to the sides of the series of pulleys a^2 b^2,) belt z^1, pulley w^1, and drum y^1; the whole being constructed and operating substantially as above described, and for the purpose of imparting a reciprocating rectilinear motion to the spindle and bobbin.

In testimony that the foregoing is a true description of my invention, I have hereto set my signature, this thirtieth day of August, A. D. 1843.

MOSES DAY.

No. 62.

Having thus fully described the manner in which I construct my machine for cutting shingles and other articles of wood, and explained the operation thereof, I do hereby declare that I do not claim the use of a horizontal rotary wheel or cutting knives, when taken alone; but what I do claim as of my invention, and desire to secure by letters patent, is the manner in which I have arranged and combined the hoppers or boxes to receive the stuff to be cut with the hammer levers, with the horizontal table, and with the knives attached thereto; said knives being so arranged, in the manner represented, as that one shingle or other article shall be cut by one knife before the other begins to operate; in the case of a shingle, the butt being cut by one knife towards the shaft, and by the other towards the periphery of the wheel.

JASON C. GILLETT.

No. 63.

Having thus fully described my improvements, I wish it to be fully understood that I do not claim as my invention the supplying of oil to the journals of axles, by means of sponge or other similar substance, as that has before been done; nor do I claim the invention of a cup or saving chamber, placed under the bearing of a journal, as caps open and exposed to the dirt, and from which the oil could be spilled by the jar of the car in motion, have been used; neither do I claim a washer or cap from the hub of a wheel, as that is now applied to common carriages. But what I do claim as my invention, and for which I desire letters patent, is constructing the box in the manner described, having two recesses or compartments in its lower section, into one of which (B) sponge or other suitable elastic substance is fitted, so as, when saturated with oil, to lubricate the journal with which it comes in contact; the other chamber (C) being made to receive the oil that flows over from the compartment B, the oil being conveyed to said

chambers through a conductor that enters the supply chamber B under the journal; the whole being combined substantially as herein set forth.

I also claim the particular manner in which I have constructed the journal and its bearings, grooves, and cap, in combination with the foregoing lubricating apparatus, consisting of the fillet or tongue, and the recess in the bearings for checking the lateral motion of the bearings, and the grooves and washer for retaining the oil, in combination as set forth.

JOHN H. TIMS.

No. 64.

Having thus described the nature of my invention, and the principles upon which it acts, that which I claim, and desire to secure by letters patent, is as follows, that is to say: I claim a mechanism for elevating the cock from the nipple, by a simple pull of the trigger, in combination with a mechanism which so separates certain parts, during and by the said pull of the trigger, as to permit the cock to be thrown down upon the nipple by the reaction of the main spring, all as set forth; and a mechanism that, by the said pull of the trigger, has a power generated within it, which, on the release of the retractile force or finger from the trigger, shall immediately reannex the disconnected parts, or restore them to their requisite positions for the accomplishment of another discharge by another pull of the trigger, as explained; the whole being arranged and operating substantially as hereinbefore specified.

ETHAN ALLEN.

No. 65.

What I claim herein as new, and desire to secure by letters patent, is the manner in which I have constructed the press, as shown by the combination of the segment wheel A with the pinion B and its shaft B^1, the axis or fulcrum of the segment A being at the jointed part of the arms, or other analogous devices that will allow of the axis or fulcrum moving from an acute angle to a straight line with the point on which the arms rest, and the line on which the gudgeon H moves, and *vice versa.* In other words, I claim the invention or discovery of moving the axis or fulcrum of a wheel or lever in the simple act of operation of said lever or wheel, the axis or fulcrum of which is at the movable joint E, so as to produce a direct force against the object to be moved, with all the advantages of the progressive power of the toggle joint operated upon by a progressive lever; the whole being combined and operating substantially in the manner herein set forth.

S. W. BULLOCK.

No. 66.

Having thus fully described the nature of my invention, and shown the manner in which the same may be carried into operation, what I claim as new therein, and desire to secure by letters patent, is the employment of a spring in combination with the steam valve of an auxiliary engine for supplying a boiler with water, so arranged, substantially as herein described, as

to admit of its being properly armed or compressed by the action of the engine upon an intermediate piece or lever, while the steam valve remains at rest, until at the proper time, by the further motion of the engine, the spring is released, and acts to draw said valve independently of the momentum of the engine, in the manner and for the purposes above fully set forth.

HENRY R. WASHINGTON.